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THE RUBBER AGE AND TIRE NEWS

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# Relation of Solid and Pneumatic Tires to Motor-Truck Efficiency*

By S. V. Norton

*B. F. Goodrich Rubber Co., Akron, Ohio*

In an excellent paper, entitled Pneumatic Tires for Trucks, by B. B. Bachman, read before the Society in February, 1919, the principal advantages and disadvantages of pneumatic-tire equipment were set forth clearly and forcefully. In my judgment, his paper is the most convincing presentation of this subject that has yet been made. Notwithstanding the apparent limitations to the economical use of pneumatic tires due to external factors, so much has been claimed in their favor since his paper was written that it seems advisable to analyze the relation of both solid and pneumatic tires in respect to their effect upon motor trucks in practical operation.

A distinction is here made between the inherent "ability" of a truck to overcome road friction and the force of gravity due to its engineering design and its ability to deliver merchandise economically under a given set of external conditions. It is largely in the latter sense that I shall discuss the subject, although I realize that the members are perhaps more especially interested in the former. In the last analysis, however, trucks must be designed and built to meet the needs of their buyers, who use them to move freight under widely differing and complex circumstances.

### *Information Sought*

Viewing the problem from this angle, I have sought information not only from truck manufacturers and their engineers, but from truck salesmen and operators in all parts of the country, as well as from tire dealers and those upon whose local service in the field the continued and successful operation of the truck depends. The information presented is not theoretical, nor based upon the experiences of selected operators whose delivery problems would invariably point to the same conclusion, but is rather a composite of the opinions of hundreds of truck operators engaged in handling all kinds of merchandise, and of hundreds of men whose business it is to help keep those trucks running economically. Because of the concentrated study that is being given to all phases of motor transportation, some factors in the problem are almost as variable as a kaleidoscope. Hence, conclusions which may appear sound today may have to be modified by changes that are gradually but constantly taking place. For instance, truck design is being altered and improved. Tires are being built better and stronger. Roads are being improved, while experience is pointing the way to the more intelligent use of motor trucks through systems and devices heretofore unknown. It therefore seems worth while to view the question of truck tire equipment in the light of recent experiences of many operators and service men, to get a clear idea of the advantages and limitations of each type.

### *General Functions of Tires*

The functions of tire equipment are: To secure traction, cushion the mechanism and the load and protect the road. From the truck operator's viewpoint the first two are of more importance than the third, although it is becoming increasingly necessary to safeguard the taxpayers' investment of millions of dollars in improved highways through proper restrictions upon the vehicles that use them. To perform these functions, solid, cushion and pneumatic types of tire are available. The general knowledge of the construction and peculiarities of each type makes it unnecessary to describe them, except to say that the cushion tire is in reality a solid tire, usually made from a specially resilient rubber compound, so designed in contour or internal construction as to be soft and yielding under pressure. Its construction generally renders it less rugged and hence more susceptible to early failure under severe service conditions. Since there are relatively few cushion tires in service at present, we may profitably confine our discussion to the solid and pneumatic types.

At present, the accepted field for pneumatic tires is on trucks up to 1½ tons capacity, and for solid tires it is on trucks of 3½ tons or over. Between these two capacities the field is debatable, and the choice cannot be made intelligently without a careful analysis of the important factors involved in each individual case. If the operators of trucks in this debatable field could surely avail themselves of all the advantages claimed for pneumatic-tire equipment, no trucks would be found on solid tires, since the claims embrace nearly everything the truck owner desires. Let us review the claims made on behalf of the tires themselves and then study them in relation to various external factors which should have an equal if not greater bearing upon the choice of equipment.

From several hundred truck-tire salesmen, as well as truck operators throughout the United States, whose opinions were asked as to the principal advantage to be gained from the use of pneumatic tires in the debatable field above described, the following table shows the reasons given with the percentage of replies for each:

| | Per cent |
|---|---|
| Greater traction | 40 |
| More cushioning | 28 |
| Higher speed | 21 |
| Lower repair bills | 5 |
| Saving in gasoline | 4 |
| More work possible | 2 |
| | 100 |

Other reasons were given for the use of pneumatic tires,

* Paper presented at the Chicago Truck and Tractor Meeting of the Society of Automotive Engineers, Jan. 28, 1920.

but they were thought to be of secondary importance. They were:

(1) Less breakage of loads.
(2) Reduced fatigue of drivers.
(3) Less depreciation of trucks.
(4) Reduced depreciation of roads.
(5) Adaptability of trucks to farm use.
(6) Lighter weight trucks possible.
(7) Increased earning power.

### *Deciding Factors in Tire Choice*

It is apparent that a careful study should be made of all the factors involved before deciding which type of tire to use. For the purposes of this discussion the factors may be divided into three groups: engineering features, practical operating features and features of tire service in the field. In taking up the engineering aspects I speak briefly and frankly as a layman and not as a truck engineer. Before changing tire equipment from solid to pneumatic it should be realized that to gain certain possible advantages other definite disadvantages must be faced. First, the wheels of the vehicle must be cut down to receive pneumatic tires. The cost of this will vary according to local conditions, but it is a large item of expense. As the pneumatic tire has a larger actual than nominal diameter, and since in many cases a pneumatic of larger nominal diameter must be used than is required for a solid tire, to secure the necessary carrying capacity, proper allowance should be provided for both body and fender clearance. It should also be remembered that the larger sectional diameter of the pneumatic tires will affect the steering clearance and that the truck will be unable to turn in so short a radius as it did on solid tires. This is especially important in negotiating turns in narrow streets and alleys, as well as in garages with limited floor space. As the larger diameter of the pneumatic tires will affect the gear reduction, the change will have a corresponding effect on the mechanical ability of the truck. If the change is made, will the truck be able to "make the grade" so far as particular problems are concerned? Will it materially affect the pay-load capacity of the truck? Will it reduce ability to carry trailers? What will be the effect upon the engine?

The increased maximum speed due to the larger diameter of the pneumatic tire will be relatively slight, provided the engine is governed to run at the same speed as formerly. If the change is made to get more speed, either the gear ratio must be reduced and the ability of the truck thus still further reduced, or the governor must be opened and the engine speed increased. There is danger here, however, as speed induces extra vibration, joints begin to loosen and before long the engine may be literally racked to pieces.

### *Factors to Be Considered*

As the engines in some trucks now have pressure-feed oiling systems, they can more safely withstand the extra speed, so far as lubrication is concerned, although this feature should be carefully investigated, as there is danger of damage from this cause with resultant expense. Still another factor which should be considered is the tax upon the cooling system if the engine is speeded up. Again, additional speed calls for greater braking ability. Before changing tire equipment assurance is necessary that with increased truck speed and the limitations imposed on the diameter of the brake drums by the reduced diameter of the wheels themselves, the machine will still have sufficient braking ability. Brakes designed for slower speeds but used under more severe conditions, will inevitably require more frequent renewal and may not even safely perform their required function. In fact, an engineer of one of the larger tire companies, advocating the use of pneumatic tires on trucks, says

> On account of the comparatively high speed of the pneumatic-equipped trucks, it is necessary to equip them with brakes having 100 per cent. more capacity than is the case with solid-tired trucks.

The question for decision is whether or not the truck can be so equipped and, if not, whether it can be safely operated on pneumatic tires.

Of no less moment than the features already mentioned, so far as the dependability of the truck is concerned, is the question of the air supply, since pneumatic tires may require from 90 to 160 lb. per sq. in. inflation pressure. As hand pumping is out of the question, a power-driven pump on the truck, or one close at hand, becomes a necessity. Relatively few trucks now running can properly accommodate a power pump. With a transmission arranged so as to permit of power take-off, a pump attachment can be put on. If the transmission is mounted amidships, it is possible to provide a device to take power from the drive shaft. If, however, the truck has its transmission in a unit with its engine, with no provision for power take-off, there appears to be no satisfactory way of attaching an air-pump, since the magneto and water-pump shaft is generally too light for power take-off. There is, of course, the possibility of adapting an electrical system for this purpose, but this does not seem practicable, because of its cost and the fact that such apparatus is not standard practice.

### *Considerations Apply to All Trucks*

While these mechanical considerations apply particularly to trucks now in operation on solid tires, most of the same problems are involved in changing the equipment on trucks manufactured but unsold. The buyer usually looks to the agent for advice regarding tires; he should therefore satisfy himself that the agent's counsel is based upon positive facts and endorsed by the manufacturer. Otherwise, more or less disappointment and dissatisfaction over the performance of the truck can be expected if the tire equipment is changed to pneumatic before delivery. To sum up, since so many important technical features are involved, it is well to seek the advice of the truck builder before changing equipment from solid to pneumatic tires. No one else knows so well the probable effects on various parts, nor can anyone advise more intelligently as to the probable loss or saving that such a move would entail upon the mechanism of the truck.

Let us next consider the practical operating features that must be taken into account in determining which type of tire equipment will make the truck most efficient in service. Broadly speaking, the efficiency of a truck in performing its function depends upon the amount of time or money, or both, that it saves for the shipper, as compared with any other means of haulage. While it is difficult to separate all the factors bearing upon these two items, they may be roughly classified as follows:

| Factors Affecting Time. | Factors Affecting Cost. |
|---|---|
| (1) Distance of hauls. | (1) Amount of pay-load and overload. |
| (2) Traffic congestion. | (2) Condition of roads; effect on tires and truck. |
| (3) Speed of delivery. | (3) Number of trips per day. |
| (4) Regularity of delivery. | (4) Cost of operation. |
| (5) Condition of roads; effect on speed of truck. | (5) Cost of upkeep. |
| (6) Number of trips per day. | (6) Cost of substitute equipment. |
| (7) Time out for repairs, etc. | |

The question of how tire equipment bears upon these factors can only be answered after careful analysis of each particular case. However, certain principles can be applied to all cases. To begin with, from 75 to 225 per cent more must be paid for pneumatic than for solid tires. The latter figure includes the cost of spare tires, which are indispensable at the present stage of development. So far as is known, there are no dependable figures indicating the relative cost per mile of the two types, because pneumatic truck tires have not been used long enough to make reliable comparisons. From such information as is obtainable, however, it is my belief that it will cost from two to three times more per mile to run on pneumatic than on solid tires. To offset this increased cost there should be a corresponding or greater saving in one or more of the factors already enumerated, as affecting the operating efficiency of the truck.

### *How Tires Affect Time Factors*

Let us now inquire how pneumatic tires may affect the time factors, assuming that the mechanical features of the truck are such as to permit of their use. If the truck is engaged in long-distance hauling with relatively few stops, pneumatic tires will almost invariably save running time, due to the fact that they absorb the road shocks so much more easily than do

solid tires. By theoretical tests in our laboratory we have found that, for a given load, pneumatic yield over four times more than solid tires. Hence a truck can be driven over long distances at much higher speeds on pneumatic than on solid tires without fear that it will be racked to pieces. It should also be noted that the drivers' fatigue in such cases is far less on pneumatic than on solid tires. In fact, some operators have considered this so important that they have placed cushions with special springs in their drivers' seats.

Up to the present, however, very few trucks as compared with the total number in operation, certainly less than 5 per cent, are engaged in long-distance hauling. The great majority of trucks operate in cities where traffic congestion is such that they cannot possibly attain a speed of over 10 m. p. h., while their average speed is from 5 to 8 m. p. h. For such speeds there is no possible saving in the list of time factors to offset the extra cost of running on pneumatic tires. Moreover, the gain will be still further reduced by idle time at loading and unloading points. In many cities an effort is being made to reduce the maximum legal speed at which trucks may operate because of the many serious accidents attributed to them. Hence, increase of driving speed within city limits may be prevented by ordinances limiting the speed of trucks. Light delivery vehicles, running on pneumatic tires, are sometimes operated at higher speeds than are legal, but these do not properly come within the "debatable field" and are not considered as dangerous as the heavier vehicles.

### *Importance of Regular Service*

In certain kinds of business such as the wholesale delivery of milk, gasoline, ice, etc., the regularity of service is the most important factor. Here the use of heavy-duty pneumatic tires is fraught with danger, due to the possibility of delays caused by punctures and poor tire service. Many operators in these and kindred lines have said that it is more important to deliver goods regularly and on time than to save a few dollars on truck upkeep. Failure in this means loss of the customer. One large truck-fleet operator in this group uses no pneumatic tires over 6-in. section because solid tires on some good make of cushion wheel have always given him greater satisfaction at less cost than have larger pneumatic tires. Such equipment usually lasts for more than 2 years without trouble.

The condition of the road surface has a very important bearing upon the time element, for it has a direct effect upon the truck speed. In fact, under certain circumstances, the increased traction afforded by the heavy-duty pneumatic tire makes it possible to operate the truck, while if it is equipped with solid tires it cannot be driven at all. This is particularly noticeable in rural districts where there are no hard-surfaced roads.

In the farm lands and citrus groves of the South, where there is so much sandy bottom and so little surfaced roadway, it is practically impossible to operate a truck equipped with solid tires. However, a truck equipped with heavy-duty pneumatic tires can operate practically anywhere and is not dependent upon the highway for traction. Under such circumstances, the ability gained by the use of the pneumatic tire is worth 100 per cent more than that of the solid tire, no matter what its cost, for the latter is well-nigh useless. It must not be supposed, however, that there are no circumstances under which pneumatic tires will fail to perform their function unassisted by anti-skid equipment. The need for proper tire and chain clearance in changing from solid to pneumatic tires is again apparent, for, if due provision is not made, the time factor may occasionally be seriously and adversely affected.

One of the advantages most frequently mentioned is the greater number of trips per day which can be obtained from a truck equipped with pneumatic tires. So far as this factor alone is concerned, there is no doubt that the advantage is in favor of the pneumatic tire.

One more important factor affecting the time element is the number of hours the truck is laid up for repairs. Let us consider separately the time lost on account of tire trouble and that for all other reasons. In comparing the relative amount of time out for tire trouble for solid and pneumatic tires, the advantage lies wholly with the former. Barring occasional lay-ups caused by defective material or workmanship, solid tires can be depended upon to give uninterrupted service from the time they are applied to the time they have worn down to the renewal point. An appointment can then be made in advance with a tire service station without seriously disturbing regular truck service, and the worn tires replaced with new ones. There is hardly a sizable city in the United States that does not have one or more hydraulic presses for this purpose and well-equipped service stations with ample stocks of solid tires. It is therefore only a question of laying up the truck a few hours at rare intervals, which can be planned so as to interfere very little, if at all, with the regular use of the truck. While the condition of the roads over which the truck operates influences to a certain extent the mileage delivered by solid tires, and hence the frequency of lay-ups for renewals, this factor is far less important for solid than for pneumatic tires.

Owing to the comparative vulnerability of pneumatic tires, they are far more likely to require time out for repairs and replacements. In the first place, they cannot withstand the same amount of overloading as solid tires, and when they are overloaded they are especially apt to give out. Such "failures" usually occur when the truck is in action and away from a service station. If the operator has a spare tire he may make the change on the road, although the evidence seems to indicate that it requires a skilled mechanic to do this and that it cannot be done easily or quickly. Most operators of trucks find it impossible to change a tire in less than 1 hr. under best conditions; under bad conditions it requires 2 or 3 hr. Punctures do not seem to be so frequent or so costly in point of time as blow-outs due to cutting and chafing of side walls from ruts, as well as to underinflation and overloading. While solid tires are cut and torn by ruts, they are not not so dangerously weakened by the process, and they rarely give out unexpectedly. If regularity and dependability of service are sought, these will be far more likely to be secured with solid rather than with pneumatic tires.

In comparing the time out for causes other than tire trouble, we find a variety of conflicting claims, although it seems to me the evidence favors the use of pneumatic tires. On the other hand, some claim that the use of pneumatic tires accelerates the wear of certain parts such as bearings, bushings and steering knuckles and that a correspondingly greater amount of time is required for their adjustment and renewal. Moreover, many owners state that the use of pneumatic tires on trucks causes their drivers to overspeed and to take more dangerous chances that result in accidents and time out for otherwise unnecessary repairs, than is the case with solid tires.

### *How Tires Affect Cost Factors*

In discussing the factors affecting the time element I have purposely avoided reference to the cost of the time, although I realize that these items all have a relative money value. In turning to the factors affecting the saving of money, it will therefore be necessary to refer to that aspect of some of the time features already mentioned. Moreover, although the two are so closely related that it may be difficult to distinguish between them, let us next consider the effect of solid and pneumatic tire equipment on the various money factors involved.

The amount of work a truck can perform, and hence the saving or profit will show, depends largely upon the amount it can carry, or its pay-load. It is generally held that the more the truck carries, the more it earns or saves. The result of this belief is the well-nigh universal tendency to overload trucks beyond their rated capacity. In fact, many operators maintain that they cannot use trucks profitably unless they overload them. I shall not here attempt to debate the wisdom of this philosophy, but in analyzing the problem the fact must be faced that nearly all operators do overload their trucks and there seems to be no simple or effective way to prevent it.

It is not uncommon to find trucks carrying twice their rated capacity.

When it comes to durability under this usage, there seems to be no doubt that solid tires will not only carry heavier overloads but will last longer in such service. All agree that the life of the heavy-duty pneumatic tire is short when overloaded. This seems the most important and least understood factor in the entire list. Apparent savings may be off-set or overbalanced by the additional trips that become necessary when an overload cannot be carried. The use of pneumatic tires automatically places a lower limit upon the pay-load which can safely be hauled under *any* conditions.

Closely allied to the cost of overloading pneumatic tires is that of underinflation. In this case the constant and extreme flexing has a tendency to weaken the side wall, making it much more likely to fail in service. It is held that drivers should give the same attention to tires as they give to water in radiators, oil in engines or gasoline in tanks. This is only another way of saying that the driver must be careful not to abuse his truck. Those who employ drivers realize how difficult it is to get men to watch these details, and the fewer such points requiring the driver's care and attention the more likely it is that the truck will run continuously and economically. While solid tires are not invulnerable, they are more nearly fool-proof and less expensive to maintain in working condition.

In addition to the likelihood of incurring expense from overloading and underinflation, there is the danger of ruining pneumatic tires from running them when loaded or overloaded after they have been punctured or blown out. It is not uncommon for drivers to ruin practically new tires by not stopping trucks as soon as tire trouble is suspected. A single blowout or puncture under such circumstances may cost from $25 to $100.

### *Roads Affect Use of Tires*

The condition of the roads over which the truck travels not only affects the speed or time factor, but has an important bearing upon the life of the tires and hence upon their cost. Pneumatics are subject to more damage than solid tires when run over roads with deep ruts because of chafing and cutting of the sidewalls.

In attempting to collect data as to mileage upon pneumatic tires, many conflicting claims and little information based on records of a dependable nature were found. Operators are apt to exaggerate both high and low mileage, due to personal satisfaction or disgust, as the case may be. Most operators when questioned closely regarding averages will admit that they have not used pneumatics long enough to obtain reliable figures for comparison with solid truck tires. Hence, none but general conclusions are possible at this time. The mileages reported, from Maine to California, varied from 200 under adverse conditions such as bad roads, overloads, careless drivers, etc., to 25,000 miles on lighter trucks, over good roads and with proper cars. Tires in city service usually gave better mileage than those in use in the country. With rare exceptions the mileage delivered by solid is considerably greater than that from pneumatic tires in the same class of service.

When the earning capacity of the truck is concerned, as judged by the number of trips per day, the advantage seems to lie with pneumatic-tire equipment, provided the runs are long enough and not restricted by such factors as traffic congestion and delays at terminals. In most cases the increased speed made possible by pneumatic tires can be converted into greater earning capacity, with little or no increase in overhead expenses.

As before suggested, there are certain conditions under which trucks on pneumatic tires can make trips when those on solid tires cannot be operated. Hence their earning capacity is just so much greater. But a new and interesting argument has recently been advanced on behalf of pneumatic tires, due to certain changes in the conduct of the business of farming. The ever-increasing use of gasoline engines for tractors, threshing machines, etc., requires the delivery of gasoline and oils direct to the farmers' door or barn. Oil men who own their own trucks and work on a purely commission basis frequently find it necessary to drive through the farmers' barnyard. It has been noted that trucks having pneumatics not only negotiate the unpaved roadways more easily, but do less damage than those having solid tires, and hence are looked upon with more favor by the farmers they serve.

When considering the relative effects of solid and pneumatic tires on the cost of operation and upkeep, a wide variety of opinions are expressed but very few conclusions based upon accurate cost records. In every other kind of business an intelligent analysis based on cost figures is considered necessary in arriving at conclusions. But few truck operators have yet realized the value of such records as applied to the cost of operation and maintenance of trucks. Hence the reliable data available are meagre.

Let us examine briefly the items which should be included in such costs, and consider how they are affected by solid and by pneumatic tires. The following items are usually not affected by tire equipment:

(1) Interest on investment.
(2) Insurance.
(3) Taxes and license.
(4) Garage.
(5) Supervision.
(6) Wages of driver.
(7) Wages of helper.

Those shown below may vary according to the type of tires used.

(8) Depreciation.
(9) Gasoline.
(10) Oil.
(11) Tires.
(12) Repairs due to (*a*) wear and (*b*) accident.

Considering these in the order given, there are, so far as known, no dependable figures covering depreciation upon which to make comparisons as no trucks have been run long enough on pneumatic tires to determine their effect on the ultimate life of the truck. While there is a difference of opinion among engineers, most maintain that the increased engine speeds of trucks designed for use on solid but changed to pneumatic tires will tend to wear out all moving parts more quickly than if the tires had not been changed. As to the relative consumption of gasoline and oil, very few reliable figures are available, but the best informed operators are inclined to feel that there is little if any saving in these items, particularly on short hauls. On long hauls, however, the advantage seems to lie in favor of pneumatic tires.

When it comes to cost of tires there is no question. The cost of pneumatics averages from two to three times that of solid tires. This is due to the higher initial cost of the equipment and the spare tires, their greater susceptibility to abuse and accident and their lower average mileage. It is, of course, possible to have pneumatic tires repaired and re-treaded, but this process has not yet been satisfactorily worked out for solid tires, at least to the point that is considered dependable or economical. The question of tire service, however, including all these features, will shortly be discussed.

### *Truck Repairs*

So far as the cost of truck repairs is concerned, comparative data of a reliable nature cannot be obtained, for in most cases trucks equipped with pneumatic tires have not been used long enough to make satisfactory comparisons. The evidence indicates, however, that, excepting the engine, repairs will cost much less for trucks using pneumatic than for those using solid tires, due to reduced vibration. If the engine is not run at excessively high speeds or continually overworked, it will prove less subject to damage if pneumatic tires are used.

Dependable figures cannot yet be obtained on the relative cost of renting substitute vehicles to replace trucks using pneumatic and solid tires which have been laid up for repairs. A superintendent of a large truck fleet using both types states that he lays up solid-tired trucks four times a year for overhaul while pneumatic-tired trucks are laid up only three times.

In any event the variation in this item of expense will not be large, provided the trucks are carefully inspected and maintained.

Summing up the factors affecting the saving of time and money, the conclusion is reached that no general claims in favor of pneumatic-tire equipment on trucks coming generally within the debatable field can be substantiated, and that the work to be done by each specific installation must be analyzed carefully before either type of tire can be safely considered the more economical.

Having reviewed the engineering and practical operating features, let us now enumerate the operator's difficulties concerning tire service. As the nature and extent of service for the maintenance and renewal of solid tires are well known, it seems unnecessary to comment upon them except to say that years of study and competition have developed this end of the business to a high degree of perfection, so that many well-equipped service stations can be depended upon for instant attention, in many cases by day or at night, whenever it is needed.

The manufacture of heavy-duty pneumatic tires of 6-in. section and larger is, however, a relatively new development. Less than a third of the manufacturers of passenger-car tires have actively started to make heavy-duty pneumatic truck tires, for they realize that the job of building a tire which will stand up under present-day use and abuse is not easy. Moreover, the task is not finished when the tire is removed from the heater. It must be sold to the dealer who, in turn, must not only guarantee the tire, but must place himself in a position to give the truck operator service. This means that he must install a high-pressure air-pump, repair material, molds for vulcanizing and in most cases a service car for emergency calls, for it must be remembered that the pneumatic tire is apt to fail when distant from its base and it cannot be driven home flat. Broadly speaking, to give service means doing whatever is necessary to keep tires in fit running condition. Specifically, it may be divided into three divisions: (*a*) inflation; (*b*) changes and renewals, including adjustments, and (*c*) repairs.

It can be said without fear of contradiction that the tire companies themselves are not as yet prepared to give really efficient service in all parts of the country. In fact, even in the principal cities this phase of the business has not been fully developed. In the smaller towns there are almost no air-tanks or pumps to keep tires properly inflated. Pumps on trucks themselves are reported as not always dependable, sometimes requiring from 15 to 30 min. to secure the desired tire-inflation pressure. Some truck operators have ventured to use pneumatic tires even though they have no pump equipment. One such operator uses a hand pump to put in 60 to 70 lb. per sq. in. air pressure. This allows the truck to be driven slowly to the nearest power pump with sufficient capacity to get the necessary pressure. A second, who has no air-pump on his truck, says he cannot afford to carry spare tires because they use too much space. If caught on a long country trip, he waits until a service car arrives and provides proper tire inflation. Another operator who has a large truck fleet equipped with pneumatic tires keeps a light service car continuously busy carrying tires or compressed air to trucks experiencing tire trouble. A fourth encountered trouble with his demountable tire equipment which he had for a long time carried under heavy inflation. It had then become smaller in inside diameter and could not be put upon the rim. The need for rust-proofing rim parts to facilitate changing has been pointed out to the tire manufacturers. It has also been suggested that if possible the tires should be made lighter in weight as the larger sizes are very difficult and awkward to handle.

### *Tire Repairs*

By far the most serious and difficult phase of giving service with heavy-duty pneumatic tires ,and that which causes the most concern to truck operators, is connected with their repair. In fact, the chief complaint in regard to pneumatic truck tires, aside from their high initial cost, is that they are subject to injuries, cuts and damage, generally of such a nature that they cannot be repaired except at the factory where they were made or, in a few cities, at a factory branch; often they are damaged beyond repair. This is not only expensive but frequently necessitates the purchase of more than one set of spare tires should the first set be injured while the others are being repaired. A tire of 7-in. section or larger, if run flat, is likely to be ruined beyond repair. In more than a dozen cities operators have said that the principal cost of punctures or blowouts is caused by the necessity of laying up trucks awaiting new tires due to stock shortage, or on account of sending the damaged tires to the nearest factory branch for repair. While repair-mold equipment has been ordered for large-section tires, the heavy demand on the part of the tire factories for new molds of all sizes and the difficulty of producing them has made deliveries very slow.

### *Repairing Truck Pneumatics*

In nearly every city the large tubes can be repaired locally, but the casings have to be shipped away, the truck operator paying either freight or express charges in both directions. Moreover, it is frequently reported that repaired casings deliver but small mileage due to the over-cure of the joined portions. This danger is more difficult to overcome in large-section tires, due to the longer cure required to vulcanize the interior portions of the new part of the casing. No doubt this feature will ultimately be corrected. The tread seems to give less trouble than the side walls, which are more susceptible to rut wear and overloading abuse.

Because so few service stations are as yet equipped to handle repairs on heavy-duty tires, dependable cost figures are not at present available. In fact, where stocks are available "adjustment" exchanges have usually been made instead of repairs. Of all the causes of dissatisfaction reported for changing back to solid after using pneumatic tires, the most numerous have been those brought about by the delays and expense incident to their repair, including additional spare-tire cost and truck hire while waiting for the return of the damaged tires. Such disadvantages are inevitable in a new development such as the one under discussion but, so far as imperfect service features are concerned, they are being overcome as rapidly as possible. In the meantime, truck engineers, salesmen and operators should not condemn the movement toward the use of pneumatic tires, for undoubtedly it will be the means of increasing the scope of usefulness of motor transportation.

Having thus reviewed the advantages claimed for pneumatic tires on trucks in the debatable field and having specified some of their relative disadvantages, I can say that, in my judgment, the question is too new to be decided theoretically or from such meagre records as are now available.

### *Specific Considerations*

What general conclusions will guide the operator in the selection of the most satisfactory and economical equipment for his particular installation? So far as I know none have been formulated and given publicity. In this connection, however, I suggest that, in the present state of development, the field for each type of tire may be separated into three classifications, within one of which the operator can reasonably locate his requirements and decide upon his equipment. These three groups are

(1) The imperative field.
(2) The economic field.
(3) The optional field.

The factors that would bring a truck within the first classification for solid tires are (*a*) if it travels over pavements not necessarily good, but having a reasonably hard road surface to provide traction; (*b*) if the delivery must positively reach its destination without fail, at a promised time; (*c*) if the delivery must be made regularly on a given schedule in which the regularity is a more important factor than either speed or cost of delivery, and (*d*) if it carries heavy loads with frequent overloads beyond the rated capacity of the tires.

Similarly the factors that would bring a truck within the imperative field for pneumatic tires are some combination of the following: (*a*) If it travels over surfaces on which traction cannot be obtained by solid tires, and when the need for traction is such as to outweigh the item of cost; (*b*) if the need for speed of delivery is more important than its cost, and (*c*) if the merchandise carried is so perishable or fragile that it must be protected from road shocks, even at high cost.

The factors that would bring a truck within the economic field for solid tires are (*a*) Short hauls in cities where speed is relatively unimportant, (*b*) heavy loads with a tendency to overload, (*c*) traffic congestion which reduces average speed, (*d*) loading and unloading delays and (*e*) need for low delivery cost.

Similarly the factors that would bring a truck within the economic field for pneumatic tires are (*a*) Road conditions which will not prematurely destroy the tires, (*b*) long hauls, (*c*) high average speed, (*d*) relatively light loads with no overloads, (*e*) good tire-service conditions and (*f*) low cost subordinated to quick service.

In analyzing the economic field, the operator must first decide whether or not he can avail himself of the potential speed pneumatic tires would give. This, of course, includes possible delays due to tire trouble as a result of bad road conditions and provided the local tire-service conditions cannot be depended upon. Next, the features of his service provided by pneumatic tires must justify their extra cost.

The distinction between the economic and the optional fields is difficult to make. In fact, the decision as to which is the better equipment may be purely a matter of personal opinion, without strong factors on either side. Hence I shall not attempt to define them.

One of the most interesting and significant developments which I have noticed is the growing tendency among truck operators to use pneumatic tires on front wheels where the need for protection from vibration is the greatest and solid tires on the rear to carry the burden of the load. This practice has much to commend it, and should steadily grow in favor. Another tendency is toward the use of some type of cushion or non-rigid wheel which, although equipped with solid tires, provides extra resilience through their peculiar construction. There seems to be a very large field in which such wheels can be used both economically and advantageously from the standpoint of improved service.

Designing engineers should study to develop cushioning effects that may be possible through other means than tires, such as cushion wheels, improved springs, shock absorbers and the like. While no mechanical device is so resilient as air, much progress must be made before the difficulties are overcome of making air serve acceptably in puncture and foolproof rubber tires, although the industry is making notable improvement in this direction. Finally, all truck operators should keep account of costs, so that intelligent comparisons may be made. In my judgment, the easiest and most effective way to do this so that all records may be readily comparable, is to use the National Standard Truck-Cost System. Thus, if they select tire equipment after a careful analysis of the peculiar conditions surrounding their problems and keep careful and accurate records of operating costs, they can reasonably expect to eliminate many of the annoying uncertainties of their delivery systems and place their tire installations upon a really scientific basis.

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# Eight Years Work on Synthetic Rubber

The author gives a summary of the story of synthetic rubbers, with which he has been concerned for almost eight years, especially with regard to the work of the Elberfelder Farberfabuken. He has described the difficulties and above all the vulcanization of the synthetic product so that it shall have good properties. The demand for this material was not of much importance up to the outbreak of the war. By the addition of basic substances and substances to prevent oxidation he succeeded in producing some very good hard rubber products. The Methyl rubber was the first to be used in the war in any quantities, and was the so-called cold polymerization product and went under the name of Methyl rubber H and the hot polymerization product under the mark of W.

Methyl rubber H served, above all things, for the production of accumulator cases, while W served as an addition to certain mixings for auto tires, and as a binder for very dry reclaimed rubber.

The greatest difficulties were in the production of balloon fabrics. The author describes the influence of various materials on the vulcanization. These were determined in the following manner: about 100 grams of Methyl rubber H and W were mixed with ½ per cent of the substance in question and sheeted out into sheets of approximately the same size and same thickness. They were now stretched, in the laboratory, between two 90° angles and placed opposite the window and allowed to stay there under the oxidizing influence of air and light.

While the results of this series of researches show that the non-volatile weak bases serve best for the production of balloon fabrics, in practice this does not hold true. He succeeded, however, in spreading usable balloon fabric with Methyl rubber.

The Methyl rubber was furthermore used in cables. In the spring of 1918, many tons of Methyl rubbers H and W were used in cables. Furthermore, the sodium-carbon dioxide, dimethyl butodiene rubber of the Boadische Aniline and Soda-fabric was used. This was designated by the "mark B." By both of these substances it was clearly shown that the addition of strong bases gives better vulcanization than is obtained with weak bases.

The use of Methyl rubber for tire purposes was accomplished by adding a small amount of dimethylaniline to the rubber in order to give it the necessary elasticity. The author shows that very many substances of an oil nature without regard to their chemical properties are able to give this elastic property of a soft vulcanized rubber to the Methyl rubbers H and W, as for example, petroleum or other mineral oils, vegetable oils, etc.

The dimethylaniline produced the best elastic products and was known as "Elasticator 1." Besides this tolindine was also used; this had the property of making the Methyl rubber constantly cold. When diphenylamine was added to the Methyl rubber to be used in insulated wire mixings the chances of the electric current breaking through the insulation were much lessened by the diphenylamine addition. Inner tubes for pneumatic tires cannot, up to the present time, be made from Methyl rubber.

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• K. Gottlob, Gummi Zeitung 33-508, etc.

# A Résumé of Recent Patents

## Patents Taken Out on Processes for Obtaining Rubber from Latex, Recovering Rubber, Vulcanizing Rubber and Producing Rubber Substitutes Since the Outbreak of the War

Little has been accomplished recently with respect to evolving new processes of obtaining rubber from the latex. On the other hand, a number of processes have been discovered for the working up of rubber from scrap and old material while numerous researches have been used for finding a useful rubber substitute.

### *Coagulation and Purification Processes*

For the coagulation of rubber from the latex, especially from the latex of Hevea Brasiliensis, S. C. Davidson, of Belfast, Ireland, proposes (U. S. Pat. 1,145,352) that to the latex, as it is collected from the rubber trees, a water-alkali solution of creosote or carbolic acid be added to the latex as it is collected from the rubber trees, and if necessary also formaldehyde; they are then mixed up. Coagulation is then brought about with acetic acid in the usual manner. The separated rubber is separated from the liquid, worked on the wash rolls and dried.

According to another process by the same inventor (U. S. P. 1,145,351), the latex is treated with ammonia or another alkali so as to prevent spontaneous coagulation, it is then mixed with 3 per cent of an alkali polysulphide or 5 per cent of alkali thiosulphate. Acids are then added so that the rubber is coagulated and at the same time a separation of sulphur takes place. After washing with dilute alkali a rubber is obtained which contains the sulphur necessary for vulcanization in finely divided form.

According to a process of Dr. Heinrich Collorseus, in Berlin (German Pat. 259,253), the coagulation of the rubber is conducted in such a manner that the proteins and other accompanying substances are converted into soluble forms by the alkali. These are then converted into insoluble compounds by alkaline earths or salts of the heavy metals. This was modified (German Pat. 280,848) in that substances are added to the latex which produce insoluble compounds with the alkaline earth or heavy metals. If these substances are neutral, then a small amount of alkali is added.

The process of G. Staunton, Muskegon, Mich. (U. S. Pat. 1,115,031), for the improvement of low grade rubber sorts is as follows: The dissolved rubber is made into a porous form in a special apparatus and the resin is removed by treatment with dilute alkali. After working and drying it is vulcanized with chloride of sulphur vapors, neutralized with ammonia and is dried.

The improvement of the properties of low grade and reclaimed rubbers, according to the specifications of Dr. Spence and W. F. Russel (U. S. Pat. 1,112,938), The B. F. Goodrich Co. (German Pat. 278,874) is brought about by treatment with alkali metals, alkali hydroxides or alcoholates in dry form. The action of the substances named can take place on the mixing rolls or in solution at a temperature not exceeding 100°C.

According to the specifications of C. P. Barry, of Paris (U. S. Pat. 1,136,462), rubber can be purified in the following manner: The dissolved rubber is subjected to dialysis in a suitable apparatus. Rubber, terra cotta, asbestos, etc., can be used as membranes. The crystalloid impurities pass through the membrane while the colloidally dissolved rubber remains behind.

The process of H. Debauge, of Paris (U. S. Pat. 1,153,040), depends on the same fundamental ideas. In order to purify the rubber it is dissolved in xylol and subjected to dialysis with agitation and heating.

The purification of rubber resin, such as Pontianak, is accomplished by heating it with a sugar solution, according to the process of W. H. Bradshaw (U. S. Pat. 1,133,790). The product obtained is non-poisonous and free from bad tasting and bad smelling constituents. It is used in the production of chewing gum.

The problem of recovering the rubber from scrap and old worn-out rubber goods for the production of rubber goods, especially from tires, is the work of numerous inventors. Considerable difficulty arises in the separation of the combined sulphur without completely destroying the rubber substance. Numerous attempts have been made to convert the depolymerised rubber into the natural rubber or a similar product.

In order to restore the valuable properties to old rubber, it is washed with benzine, dried and covered with a mixture of boiled linseed oil, turpentine oil, calcined gypsum or clay and heated in a closed vessel in the absence of air. (F. Morench, Rushville, Ill., U. S. Pat. 1,172,158.)

Old rubber goods or rubber covered objects, such as typewriter rolls which have lost their elasticity, can have it restored by rubbing the goods with a solution of camphor in alcohol to which is added finely powdered pumice stone. (A. A. Wright, Oakland, Cal., U. S. Pat. 1,114,841.)

According to the specifications of R. B. Price, New York City (U. S. Pat. 1,666,784), the scrap of vulcanized rubber may be utilized in the following manner: The finely divided scrap is freed from air and moisture by gentle heating in a vacuum after which it is heated under high pressure at the vulcanizing temperature and then suddenly cooled.

In order to bring about the devulcanization of rubber, S. E. Allen, Akron, Ohio (U. S. Pat. 1,178,483), uses an oil which is obtained by the distillation of Pinus-palustris. Its properties lay between those of turpentine oil and rosin oil. The finely divided rubber scrap is heated in a closed vessel with this oil and water, and after cooling it is washed and dried. If the rubber scrap contains fibre then some sulphuric acid is added to the water.

### *An Exceptional Reclaim*

A reclaim possessed of exceptional properties is obtained, according to H. F. Mayers, Cleveland, Ohio (U. S. Pat. 1,167,-359), if the oil of Pinus-palustris is freed from its resinous constituents by steam distillation.

According to the process of Gray Staunton, Muskegon, Mich. (U. S. Pat. 1,168,230), there is obtained from the scrap of vulcanized rubber a product equal to the crude rubber if the dry, finely pulverized scrap is mixed with dry calcium carbonate or sodium carbonate and the mixture heated without melting the rubber. After it cools it is washed, if necessary, with an addition of acid.

According to another process of the same inventor (U. S. Pat. 1,169,437), the dry mixture of finely pulverized rubber scrap and calcium carbonate in thin layers is heated with superheated steam under pressure in a closed vessel.

According to H. W. Kugler, Akron, Ohio (U. S. Pat. 1,124,920), finely pulverized rubber scrap is heated eight hours under pressure with a water solution of alkali hydroxide to which is added about 2-5 per cent of an aromatic amine, such as aniline, toluidine, etc. The reclaimed is washed with water and dried. It is plastic and can be vulcanized as new

Dr. G. Wilhelm, Kunstoffe. Vol. 9, No. 9, page 113

rubber and with rubber solvents it produces solutions resembling natural rubber solutions.

H. B. Cox, Bedford Hills, N. Y. (U. S. Pats. 1,102,759 and 1,202,760), claims the following process for the reclaiming of rubber from old vulcanized rubber. Resin is heated, especially rubber resin, until the water and the volatile constituents are driven off. The residue is pulverized and dissolved in gasoline, naphtha or a similar substance. Then the finely divided scrap is placed in the resin solution, ¼ per cent resin calculated on the weight of the scrap, and allowed to soak for considerable time. Then it is heated and the solvent distilled off. The devulcanized rubber obtained differs only slightly from the natural product.

Ludwig Sachs (Austrian Pat. 67,126) makes use of old rubber in the following manner: The old material is finely ground and heated at high temperature, under pressure if necessary, with sulphurizable oils such as rapeseed, castor oil, etc., and metallic sulphites as sodium sulphite.

B. J. F. Varenhorst and J. G. Fol (U. S. Pat. 1,198,975, German Pat. 302,995) have a process for the recovery of rubber from old materials which is carried out in the following manner. The finely divided and washed scrap is heated in a vacuum or an inert gas, as carbon dioxide, nitrogen, etc., until shortly before melting and is then suddenly cooled with cold water. Thus the reclaimed mass is protected from the injurious effect of the air at the high temperatures.

According to the process of Dr. Werner Esch in Hamburg (German Pat. 293,496), the combined sulphur in the vulcanized rubber scrap may be partially separated, if the finely divided scrap is boiled in caustic soda solution for the purpose of removing the free sulphur, is filtered or centrifugalized and the finely divided scrap, which is still moist with caustic soda solution, is heated with phenol or creosote. Caustic soda solution is added to the resulting solution and an emulsion is obtained which may be filtered if necessary. It is then heated with chips of metal which will set free hydrogen with caustic soda as zinc or aluminum chips.

For the purpose of destroying the emulsion, carbon dioxide is conducted into it and the phenol-rubber solution is distilled with steam. The remaining residue with only slight sulphur content (depolymerised rubber mass) is dried and milled with a polymerisation medium, as metallic sodium, and washed.

According to T. Gare, New Brighton, England (U. S. Pat. 1,133,952), the old material is ground up into a fine state by degrees by treating the scrap in a special grinding machine which converts it into the finest condition possible; finally to the mass is added warmed benzol or similar liquid. The reclaim forms a homogeneous plastic mass and can be used in the usual warmer.

According to the process of W. Golombek, of Spandau (Ger. Pat. 303,171), in order to separate the rubber in a vulcanized rubber mixing which contains fabric the finely ground scrap is placed in water at 30-35°C. The fabric absorbs water and sinks while the wet rubber particles remain on the surface and can be skimmed off.

### *Separating Rubber from Fabric*

According to the process of C. P. Bary, of Paris (U. S. Pat. 1,182,071), the rubber in old automobile tires can be separated from the fabric layers in the following manner. The tires are soaked in xylol for several days. The rubber is thereby swelled up, made soft, and is easily separated from the fabric. The removal of the fast clinging rubber to the fabric is accomplished by rotating brushes. The xylol is separated from the reclaimed by distillation under diminished pressure, by steam distillation or with alcohol and acetone.

In order to recover the rubber from rubberized fabrics or pneumatic tires, without destroying the fabric, they are heated with tetrachlorethane. After filtering the solvent is distilled off by steam distillation, and the rubber separated from the water (Comp. gen de Caouchous deterebenthine in Bruxelles, Swiss Pat. 72,731).

According to the process of H. R. Murdock, Naugatuck, Conn. (U. S. Pat. 1,189,282), the old rubber goods are finely pulverized and mixed with proteins, oils and water and heated under pressure in a closed vessel. By this process the proteins are converted into amino acids by hydrolysis and these amino acids act on the cellulose. The conversion products of the cellulose remain in the reclaimed.

O. A. Wheeler, Chicago (U. S. Pat. 1,135,236), treats the finely divided fabric containing rubber scrap with about 20 per cent caustic soda solution and heats it in a closed vessel with carbon disulphide and the cellulose is converted into cellulosexanthate. Then the mixture is diluted with water and heated again for about fifteen to twenty hours. There is obtained a mixture of devulcanized rubber and a viscous, structureless cellulose which can be vulcanized in the usual manner.

### *Vulcanization*

The object of numerous researches on this subject is the discovery of new vulcanization accelerators, which may be used in the vulcanization of the synthetically produced rubber-like products.

In cold vulcanizing by means of a solution of sulphur chloride in gasoline there is obtained a bad smelling vulcanized product. The cause of this phenomena is, according to P. J. Murril, New York, N. Y. (U. S. Pat. 1,166,777), that the olefine content sets free the ill-smelling compounds with the sulphur-chloride; this takes place in the vulcanization. In order to make possible the use of gasoline and sulphur chloride, the gasoline and sulphur chloride are mixed and then distilled. The solution of sulphur chloride in gasoline goes over, which is free from olefins and forms a good vulcanizing product. For the separation of the olefins from the gasoline, halogens or fuming sulphuric acid can also be used, or they can be hydrogenized according to the usual processes.

By the usual process for the production of rubber goods by the dipping process, the forms are dipped in the rubber solution and after each dipping are dried in the air. The loss of solvent is very great and in addition the vapors are dangerous to the health of the worker. By the evaporation of the solvent the temperature is lowered and this causes a deposition of the water from the air. All these disadvantages are avoided by the process of R. B. Price (U. S. Pat. 1,161,967). The objects after dipping are allowed to dry in a closed room under diminished pressure.

For the purpose of vulcanizing rubber the rubber sulphur mixing is first heated below the vulcanizing temperature under diminished air pressure, then heated under high pressure at the vulcanizing temperature, A. D. Warner, Mishawaka, Ind. (U. S. Pat. 1,163,050).

By the mixing of rubber with sulphur and the usual fillers considerable air is taken up by the mass and this fact leads to the formation of undesirable porousness in the vulcanization which follows. In order to diminish these facts R. B. Price (U. S. Pat. 1,158,843) mixes the single constituents in a vacuum, or mills the ready mixed compound in a vacuum for a considerable length of time.

For the same purpose is the process of L. C. Warner, Naugatuck, Conn. (U. S. Pat. 1,122,824), according to which the rubber-sulphur mixing in the vulcanizer is first subjected to a vacuum for some time in order to remove the enclosed gases and the easily volatile constituents, then the pressure is raised by the introduction of a warm inert gas such as carbon dioxide under compression, and finally heating under pressure at the vulcanizing temperature.

The vulcanization of rubber goods such as tires or rubber soles can be brought about in the manner set forth by R. B. Price (U. S. Pat. 1,152,834) as follows: The goods are heated in a bath of a substance which is fluid at the vulcanizing temperature, for example, solutions of calcium chloride, barium nitrate, or calcium acetate, glycerine, wax. Low melting metallic alloys may also be used, and high hydraulic pressure may be used in these heating baths (U. S. Pat. 1,152,835).

*(To be continued)*

# Rubber Division Meets In St. Louis

## Important Gathering Held in Connection with Meeting of the American Chemical Society at Hotel Statler, April 14 and 15—Interesting Papers and Discussions a Feature

Members of the Rubber Division of the American Chemical Society attended the second meeting of the organization, which was held in the Hotel Statler, St. Louis, Mo., Wednesday and Thursday, April 14 and 15. Nearly 100 members were in attendance and the meeting proved noteworthy in many respects. A number of interesting papers were delivered and many of these led to discussions which were of considerable value in themselves.

The first was the consideration of the report of the committee of the Standardization of Methods of Physical Testing. J. M. Bierer pointed out an apparent error in the tentative methods and called attention to the work of the subcommittee of the Rubber Association. It was agreed that for the present at least both English and Metric units would be used. The subject was disposed of by instructing the committee to cooperate with such other technical societies and organizations as the A. S. T. M., Navy, Bureau of Standards and Rubber Association, and to work with the definite aim of having a single set of specifications agreeable to all concerned. It was suggested by W. W. Evans that the committee should also consult the manufacturers for criticisms of these specifications.

### *Discussion of Standardization of Rubber Analysis*

The executive committee reported that Mr. Oenslager had resigned from the committee because of an extended trip in the Orient. The question of standardization of methods of rubber analysis was then discussed and it was decided that a symposium on this topic will be given at the next meeting. It is the intent of the committee that all unusual methods of analysis shall be brought to light, and that the many present methods be correlated and their good or objectionable features emphasized. The committee took no action on the subject of the writing of methods of testing, either the variability of crude rubber or of compounding ingredients, inasmuch as they felt that the Rubber Division was not in a position to make the manufacturer feel the need of buying material on its specifications, or to make the rubber plantation men feel the necessity of any change from present methods.

C. Olin North then took the floor and stated that there are on the open market today a large number of accelerators sold under trade names. The trade names in many cases seem to be used to disguise the true identity of the substance and allow an inferior product, perhaps cheapened highly with filling material, to be marketed. He pointed out that thiocarbanilide is the major active constituent in as many as eight different trade accelerators. A good many of the smaller manufacturers are misled into using inferior accelerators and are paying high prices for them. It was stated that one accelerator consists mainly of sodium hydroxide and starch and another of 90 per cent barytes, and that both sell for high prices.

It was brought out that trade names for legitimate products are not misleading, but that the practice of misnaming accelerators is. A motion was made, seconded and carried that the secretary give publicity to the fact that the Rubber Division condemns the practice of the marketing of accelerators or compounding ingredients in such a manner as to conceal their true constituents. This particularly is true where diluents are added for any other purpose than to give a more uniform distribution in the stock. It was further decided that the true constituents of the common accelerators on the market should be made known by the manufacturers or else by the Division. This will be done in the near future.

### *Abstracts of Important Papers*

During the progress of the meeting a number of extremely interesting papers were read.

"*The Diffusing Power of Pigments*" was the subject of a paper by W. K. Lewis and F. P. Baker. This brought out the fact that the diffusing power of pigments can be determined by measuring the weight of pigment per unit of cross sectional area necessary to obscure objects behind a suspension of the pigment, the result being expressed as square centimeters per gram or square feet per pound. The determination can be carried out in simple apparatus and results can be checked with accuracy. It is believed that the diffusing power is the most satisfactory measure of the fineness of a pigment, and as such is of obvious interest and value to the rubber trade.

"*A Direct Method for the Determination of Rubber Hydrocarbon in Raw and Vulcanized Rubber*" was a subject taken up by W. K. Lewis and W. H. McAdams. This subject in brief was as follows: It has been shown by a volumetric method involving a double titration that the bromine consumption, corrected for the observed substitution, is a true measure of the actual amount of pure rubber hydrocarbon known to be present. Although the amount of substitution increases with the length of the bromination period, the addition corresponds quantitatively to the actual amount of pure rubber hydrocarbon present when the bromination time is from two to four hours.

Experimental data is given to show that the actual per cent of $(C_{10}H_{16})_n$ in vulcanized soft rubber can be determined by a volumetric bromination method herein described, involving a second titration to correct for the substitution which accompanies the particular analysis by titrating in dim daylight, this substitution correction can be made very small.

Concerning the above methods of analysis it was brought out that the combined sulphur was determined directly by the ordinary procedure. Any sulphur combined with accelerators introduces a slight error, while mineral rubber introduces a considerable error. It was stated by Dr. Lewis that the method is of no application in determining the coefficient of vulcanization. J. B. Tuttle brought out the fact that a weight burette is the most convenient apparatus to be used in a determination of this kind.

### *Recovery of Volatile Solvents*

"*The Recovery of Volatile Solvents*" was taken up by W. K. Lewis. Solvents used in the rubber industry may be recovered by the use of any method such as absorption, compression or cooling. Ordinarily in the rubber industry the solvent vapors are diluted with a large quantity of air and in this case the absorption method is best. When such conditions are present so that one has concentrated vapors a compression method becomes available. Benzol used in pregnating cord tire fabric may be recovered with an efficiency of 90 per cent by enclosing the impregnating apparatus and passing the vapors through an absorption tower. The danger of fire or explosion may be eliminated by passing flue gas into the apparatus.

"*Small Amounts of Magnesia and Certain Organic Substances as Accelerators*" presented by G. D. Kratz and A. H. Flower, was briefly as follows:

The activity of small amounts of extra light magnesia as an accelerator was compared with the effect of similar amounts of certain organic accelerators. The load required to effect

a given extension was found to be a fair measure of the rate of cure of the mixture which contained magnesia; however, this was not true for the mixtures which contained the organic accelerators.

The accelerating activity of magnesia in small amount was found to be of secondary or contributory character, acting in conjunction with, or in response to, certain extraneous substances, probably nitrogenous, present in the rubber. The amount and nature of these extraneous substances was found to limit the activity of magnesia as an accelerator.

### *Microscopic Examination of Rubber*

*"The Miscroscopic Examination of Rubber and Rubber Products,"* Henry J. Masson and Irene C. Diner, was the subject of another paper.

The authors presented the results of their investigation in the line mentioned in the title. Magnifications of from 50 to 2,000 diameters were used. Best results were obtained at magnifications of about 800 diameters. The ordinary methods of metallurgy were resorted to, both oblique illumination and vertical illumination being used. Photomicrographs were shown at the meeting of various samples which had been examined.

Discussion of the above paper brought out the fact that the magnifications used were not large enough to tell anything about such pigments as zinc oxide or black. It was also noted that some microphotographs had been made on extracts rather than on the rubber itself. An extended write-up appeared in many papers throughout the country concerning the wonderful achievements of the authors in their microscopic work. The members of the Division did not find the paper to be of other than ordinary interest.

*"On the Determination of True Free and True Combined Sulphur in Vulcanized Rubber,"* by W. J. Kelly, was another interesting subject.

A great deal of sulphur is considered present as free and combined. Acetone soluble sulphur may be partly combined with resins, etc., as may also the sulphur insoluble in acetone, heretofore considered as combined with rubber. The total acetone extract is soluble in ETOH, but if EtoH saturated with sulphur is employed, none of the truly free sulphur will dissolve and hence can be separated from the remainder of the extract. Results show about 0.4 per cent sulphur combined with resins, etc.

About 85 per cent Heavea is saponifiable and hence any resinous sulphur compounds insoluble in acetone may be soluble in alc.KOH. Acetone extracted sample is boiled eight hours in 5 per cent alc. KOH and about 0.26-0. 30 per cent sulphur is extracted. Successive extractions do not increase this. Hence, the rubber is not being decomposed. These results are on pure gum and sulphur stocks and will soon be extended to compounded stocks.

C. R. Boggs called attention to the fact that true free sulphur may be determined by suspending a coil of copper gauze in the acetone extract during extraction. The copper combines with the sulphur and its increase in weight is the true sulphur in the extract.

On discussing *"The Value of Shoddy in Mechanical Rubber Goods"* J. M. Bierer presented a chart which gave the cost relations between scrap evaluated rubber and reclaimed rubber. A line of demarkation through the center of the chart showed where it was more economical to use new rubber or reclaimed rubber.

On *"Rubber Chemistry from the Colloidal Viewpoint,"* Ellwood B. Spear discussed the mechanism of crystallization, condensation, polymerization and coagulation. Gelation is one type of coagulation. Selective absorption is given as a reason for the increased tensile strength of compounded rubber. This deals with the different surface energy of rubber and the various compounding ingredients.

*"The Effect of Compounding Ingredients on the Physical Properties of Rubber,"* by C. Olin North, evoked considerable interest.

Compounding experiments in which from one to fifty volumes of filler, i.e., gas black, zinc oxide, etc., were added to 100 volumes of rubber are described. The values obtained for tensile strength, etc., are corrected back to the actual volume of rubber present and another set of curves drawn.

Tensile strength calculated on area at rest is unfair to a soft stretching stock. Tensile at break is suggested as a better basis of comparison. This is obtained by multiplying usual tensile strength by final length and dividing by the original length times a correction factor, because of volume increase during a stretching.

A visual picture of the physical structure of rubber, i.e.; network hypothesis based on the assumption that large colloidal aggregates function as elastic fibres and the smaller as plastic material, was presented. Vulcanization probably locks up these fibres to form a network.

A considerable discussion followed the reading of this paper. W. B. Wiegand stated that he had obtained data which checked Mr. North very closely. Mr. Wiegand preferred to use the area under the stress strain curve in comparing the quality of stocks. He stated that there must be a surface energy relation between the rubber and the compounding ingredients and that this is responsible for the increased tensile on compounding. Mr. North stated that he could not check up Mr. Schippel's figures for volume increase in a zinc stock. It was brought up during the discussion that there is an overloading effect after thirty-five volumes of zinc oxide or thirty volumes of black have been added to one hundred of rubber.

W. W. Evans in his talk on the testing of pigments brought out that the common tests are as follows: 1—Examination for freedom from dirt; 2—Comparison of color with standard; 3—Comparison of fineness with standard, (a) Test by sieving, (b) microscopic examination; 4—Test for Moisture; 5—Acidity or alkalinity; 6—Analysis for impurities which might affect the stock; 7—A compounding test to see if the ingredients give similar results as past samples. Attention was called to the fact that a microscopic examination of the pigment was the best general test.

An extremely interesting symposium on the "Chemistry of Colloids" was held on Thursday morning.

A number of the original papers as they were given will be published in the near future.

### *The Roster*

Among those present were the following: John B. Tuttle, N. A. Sheppard, Stanley Krawl and Ralph E. Hall, Firestone Tire & Rubber Co.; Frank P. Brock, Redman Chemical Products Co., Chicago; Edwin De Barr, University of Oklahoma; Robert J. Bonstein, H. L. Arbogast, Kelly-Springfield; D. F. Cranor, Lee Tire & Rubber Co.; C. W. Sanderson, Fisk Rubber Co.; G. Wysong, General Tire & Rubber Co.; R. B. Arnold, Richmond, Va.; Charles G. Miller, McClaren Rubber Co.; H. B. Underwood, Ajax Rubber Co.; R. H. Grote, R. Wakeland, J. A. Fleischli, F. W. Frericks and H. W. Ramsey, Cupples Co.; B. H. Work, Carborundum Co.; A. R. Picker, Picker & Beltman Chemical Corporation; H. J. Masson, New York University; J. D. Robertson, Robert W. Hunt & Co.; E. C. Gaskill and H. A. Depew, New Jersey Zinc Co.; W. J. Kelley, A. H. Smith, C. W. Bedford, Goodyear Tire & Rubber Co.; L. V. Redman, Redmanol Co.; P. A. Ritter, Federal Rubber Co.; R. W. McCreary, McCreary Tire & Rubber Co.; G. C. Given, Atlas Powder Co.; J. F. Walsh, New York; Charles P. Derlith, Celite Products Co.; John M. Bierer, Boston Woven Hose Co.; W. K. Lewis, Massachusetts Institute of Technology; A. J. Walker, Archer Tire & Rubber Co.; L. J. Plumb, V. A. Gillier, U. S. Rubber Reclaiming Co.; W. T. Runals, Akron, Ohio; L. J. D. Healy, Racine Auto Tire Co.; P. R. Manahan, Cleveland; R. F. Browning, Philadelphia Rubber Works; E. H. Grafton, Quaker City Rubber Co.; H. A. Morton, M. M. Harrison, Miller Rubber Co.; A. W. Wentz, Victor Rubber Co.; W. B. Wiegand, Ames, Holden MacCready Co.; J. R. McGregor, C. E. Gilson, J. H. Calbeck, L. E. Kelly and W. H. Hayt, Eagle Picher Lead Co.; W. H. Whitcomb, W. D. Bradley, U. S. Rubber Co.; H. L. Fisher, W. W. Evans, E. R. Bridgewater, B. F. Goodrich Co.; C. W. Howlett, Kokomo Rubber Co.; J. H. Young, H. H. Robertson Co.; Frederick Dannerth, Brooklyn, N. Y.; Paul Van Cleef, Van Cleef Bros.; James Driscoll, Hodgman Rubber Co.; R. P. Calvert, R. G. Woodbridge, C. D. Abraham, The Dupont Co.; Robert B. Terry, American Zinc Co.; H. W. Curry, Hillsboro, Ill.; F. J. Boehm, Inland Rubber Co.; W. F. Zimmerli, Howe Rubber Co.; G. N. Kennedy, Domino Tire Factory; R. D. Gartrell, Canadian Consolidated Rubber Co.; W. E. Glancy, Hood Rubber Co.; J. P. Millwood, Okonite Co.; C. R. Boggs, Simplex Wire & Cable Co.

# News From The Trade at Large

*Kenyon to Manufacture Tires—Standard Four in South—Legal Department for Mason—Oak Rubber Rebuilds—New McClaren Chemical Building—Sturges with Hummel & Robinson*

### Kenyon to Manufacture Tires

On April first, the C. Kenyon Company, of Brooklyn, N. Y., operating one of the largest fabric rubberizing plants in the United States, will start manufacturing Kenyon Cords, a new and perfected cord tire of the highest grade. Back of the Kenyon entry into the tire manufacturing field are over sixty years of experience with rubber compounds—a world-wide reputation in the handling and manipulation of rubber—and the resources of a great plant equipped with the very last word in tire-making machinery and facilities.

The decision of the Kenyon Company to make cord tires is a logical development of their business and previous history. Starting in 1857, the company has acquired through long and varied experience an intimate knowledge of rubber, its compounding, and its application to fabric, that it is now known as the leading authority of rubberizing fabrics throughout the country. The two great plants of Pacific Street, Brooklyn, and on the Bay Ridge waterfront employ nearly 3,000 people—their products range from raincoats to the large rubber blankets used in offset printing plants—and the company has been having marked success in producing cord fabrics for other tire manufacturers. It is natural, in view of this, that the Kenyon Brothers have decided to begin tire manufacturing themselves, and the resulting tires will soon be appearing on many a car.

The Kenyon Company intends to produce oversize cord tires exclusively—and of the highest grade exclusively. The Kenyons have patented a new tread—of rectangular form, and truly non-skid because it offers a straight-line resistance to both the side and forward skid.

Kenyon cords are to be made at the Bay Ridge factory; a building of the most modern concrete construction, completed only last year. Two of the ablest tire manufacturers in the country will be in charge. Five hundred cord tires can be manufactured in an eight-hour day, but the plant is so arranged that this volume can be doubled in short order and with minimum expense.

Besides, every mechanical feature known to make the building safe, the factory contains such provisions for the service and health of the employes as a cafeteria with food at cost, recreation and smoking rooms, a roof garden and a finely-equipped hospital with a competent medical staff.

### Standard Four in South

The closing of a contract the other day with the Currie-Akers Tire Co., of Atlanta, Ga., for the exclusive distribution of Standard Four tires in five Southern states marks the opening of an intensive Standard Four campaign throughout all of that territory, according to news from the factory at Keokuk, Iowa.

The territory involved in the transaction includes: Georgia, Florida, Alabama, South Carolina and North Carolina. B. F. Dillon, Southern sales manager of the Standard Four Tire Co., who has been closely connected with the negotiations, will spend a few weeks with the Currie-Akers Tire Co. in getting the big drive under way. F. R. Eyer, the Standard Four general sales manager, also was in Atlanta and supervised the closing of the big contract.

"The opening of a big distributing house in Atlanta is of unusual significance inasmuch as it is the occasion of our first real step into a nation-wide field," said Mr. Eyer. "For five years we have been building tires, but limited production facilities made it necessary for us to confine our sales activities to the middle states. The completion of a new factory unit this year, however, enabled us to more than double our output and now we are ready to meet all comers."

Mr. Eyer predicts a serious tire shortage before the end of the year. He points out that the demand will call for between 40,000,000 and 50,000,000 tires while the estimated output of all the tire factories will fall away below 40,000,000 tires.

The shortage, Mr. Eyer explained, is largely due to scarcity of fabric, inasmuch as the textile mills have not increased their facilities enough to answer the soaring demand from tire factories. He added that those tire factories that are now so unfortunate as to be without fabric are compelled to pay nearly twice as much as the actual value of the fabric in order to obtain enough to keep their plants in operation.

### Legal Department for Mason

Orin C. Clement, recently of Toledo, Ohio, has been chosen as the head of the Legal Department of the Mason Tire & Rubber Co., of Kent, Ohio, and is now in charge of all the legal matters of the organization in his temporary quarters in the former down town fabric offices.

The legal department from the outset has complete charge of all matters from every angle which are of a legal nature.

Mr. Clement is a man of nearly ten years' experience in the legal profession, nine years of this time being spent in actual practice in the city of Toledo.

He is a graduate of the University of Cincinnati, with the degrees of A. B. and LLB. For four years he has been a national officer and a very active member of the Delta Tau Delta fraternity and also is a member of the nationally known law fraternity, the Phi Alpha Delta.

### Oak Rubber Rebuilds

The plant of The Oak Rubber Company was totally destroyed by fire on March 15, 1920. The buildings destroyed consisted of the main building 50 x 200, three floors, power plant 40 x 40, and a number of outside frame buildings used for various purposes. Total fire loss of $150,000 which was partially covered by insurance.

In spite of this loss construction is already under way for two new units, one of 40 x 200, part one floor and part two floors; one unit 60 x 200 of two floors; power unit of 40 x 40. This will give a larger floor space than was had before. Construction will be of re-inforced concrete throughout, equipped with sprinkler system, and special equipment for the fighting of fires common to the dipped rubber goods business.

It is the intention of the organization to make this seeming misfortune a forward step in the growth of the concern.

RUINS OF PLANT OF OAK RUBBER CO.

The plans of the new buildings have been based upon long experience in the manufacture of dipped rubber goods specialties, the latest and most up-to-date machinery will be installed and every means and method that will enable them to turn out a better product will be adopted in the new plant.

Operations will be begun in the new factory on or about August 15th, 1920, in one of the most up-to-date and modern plants in the dipped rubber goods line in the country.

### New McClaren Chemical Building

The McClaren Rubber Company, Charlotte, N. C., has just completed a chemical testing laboratory, which for equipment and modern methods is equal to any in the industry, it is said. C. G. Miller, who has been appointed chief chemist, is a graduate of Perdue University and formerly served the Racine Rubber Co. in a like capacity.

H. L. McClaren, president of the McClaren Rubber Co., has been appointed a member of the board of fifteen to look into the disposition of the United States merchant marine.

### Sturges with Hummel & Robinson

Hummel & Robinson, manufacturers, exporters and importers of chemicals at 26 Cortlandt street, New York, N. Y., have announced that W. R. Sturges will act as their representative for the southern territory. Mr. Sturges has been connected for the last seven years with Reichard-Coulston, Inc., of New York.

### New Rubber Combination

Recent rumors to the effect that a new tire combination would shortly make its appearance have crystallized in the announcement of the Rubber Corporation of America. This organization, which has been capitalized at $2,000,000, will take over the sale of all products of the Empire Rubber & Tire Co., of Trenton, N. J., the Sterling Tire Corporation, of Rutherford, N. J., and another firm from the Middle West. No information has been given out as to the selling policy of the new firm, but it is believed that all sections of the country will be covered.

W. M. Pepper, president of the Empire company, is chairman of the board of the new organization and is also its treasurer. E. L. Reynolds is president and C. A. Bates, president of the Sterling company, is first vice-president and head of advertising for the new company. The other vice-presidents are: W. A. Reynolds, in charge of mechanical goods sales; J. Baker Taylor, in charge of the eastern section of the country; Ralph V. Dickinson, central states, and W. D. Harris, in charge of the Pacific Coast section. It has been stated that the company will have warehousing facilities at Boston, New York, Philadelphia, Atlanta, Cleveland, Chicago, Kansas City and San Francisco.

### New York Employes Dance

Members of New York Rubber Employes Social Society enjoyed a supper-dance held at the Hotel McAlpin, New York City, on April 14th. The object of this affair was to bring together all the rubber trade employes of New York in order to promote fraternalism and to form a social organization.

Dancing was started at 8:30 P. M., music being furnished by the Clef Club, formerly the famous band of the late Lieutenant Jim Europe. Supper was served at 11:30 in the Mezzanine Dining Room, during which time entertainment was furnished by the Clef Club and the vaudeville team of Murdoch and Finch. After supper dancing was resumed and continued until 2 A. M., when "Home, Sweet Home" was played. A very enjoyable evening was spent by the three hundred attending.

The object of this initial affair was to bring together all of the rubber trade employes of New York to promote fraternalism and to organize a social club. The committee in charge was as follows: John A. McKee, Wm. L. White, H. C. Waterman, Wm. Walz, Charles W. Sweeney, Wm. Smith, Thomas Ryan, N. S. Robinson, James A. Phillips, J. Drescher and Charles J. Carr.

### Chamber of Commerce Meets

The rubber industries of the country are showing a deep interest in a great gathering of business men from all parts of the country to be held at Atlantic City, April 27 to 29 under the auspices of the United States Chamber of Commerce for the purpose of making a comprehensive study of means to stimulate production in industry.

In calling the business men of the nation together to discuss this subject, the National Chamber realized that lack of production in all lines of industry is a big factor in our present towering prices and that high prices breed social unrest. Many economists and business men are convinced that once production is speeded up and the supply is greater than the demand then there will come an appreciable cut in prices in the necessities of life.

With this thought as a background, the convention will consider the question of maximum production from its manifold angles. Finance, labor, agriculture, transportation and numerous other phases that enter into the scheme of production will be studied according to their relative importance to a greater output.

Men prominent in each of these respective lines of industry and commerce will present their views to the convention. The banker will explain the need of extending a helping hand to Europe in order that Europe may become once more a producer rather than a consumer. For more than four years, Europe has been depending largely upon the United States for its commodities. The demand has been greater than our industries could meet. The result has been advanced prices. If European industries can be put back on their feet again by supplying them with raw materials and credit then the strain will be partially relieved, and American industries will be able to supply more goods to meet the domestic demand.

The worker's viewpoint on production will be presented by a prominent member of the American Federation of Labor, while a business man will discuss the manufacturer's position.

Among the representatives of the Rubber industry the following will attend the conference: F. A. Sieberling, Goodyear Tire & Rubber Co., Akron, Ohio; G. B. Hodgman, Hodgman Rubber Co., Tuckahoe, N. Y.; H. E. Sawyer, United States Rubber Co., New York, N. Y.; A. L. Viles, General Manager Rubber Association of America, New York, N. Y.

### Egyptian Cotton Conditions

The following resume of cotton conditions in Egypt during the week of March 19 has been received by the Alexandria Cotton Company, Ltd., of Boston, Mass.:

Transactions on the futures market have been free of any restrictions since last Monday, but the volume of business passing has been very small. March closes today at $152.50 and May $155 against $146.50 and $147.50 last week.

The recent break in prices was a severe lesson to speculators; they suffered very heavy losses and for the time being are not in a position to commit themselves by further operations. On the other hand it cannot be expected at this time of the season, with the actual supplies of cotton so small and the risks, as exposed by recent events, of "futures" as a hedge, that business of a purely commercial character could be extensive enough to make an active market.

In the spot market the demand had been again confined to the better qualities of Sakellarides, the supply of which is getting scarce and is firmly held. Prices of Sakellarides qualities have not followed the fluctuations of the futures market, and F. G. F. is not obtainable cheaper than about $10 on. It looks as if the basis for G. F. and better will further harden and spinners who have still to buy these styles should not delay purchases much longer, as supplies are getting steadily smaller.

Uppers have again been neglected and the discount with Sakel has further widened.

"Crop 1920": The weather so far has been unfavorable to sowing and germinating, and resowings are necessary on a larger scale than is normally the case; the delay at present is estimated at about 15 days but of course with improved conditions during the next three months this delay may easily be recovered.

### Johnson Credit Manager for Mason

Harry M. Johnson, who for the past year has been assistant credit manager, for the Mason Tire & Rubber Co., Kent, Ohio, has been appointed credit manager to succeed W. J. Rennick who resigned his position as manager, effective March 15.

Mr. Johnson joined the Mason organization on March 10, 1919, as assistant-credit manager and served in that capacity until his recent appointment last month to the head of the department. He is a man of experience in the credit branch of the tire business, having served as credit manager for the McGraw Tire & Rubber Company of East Palestine, Ohio, for a period of four years prior to his joining the Mason force.

Mr. Johnson has had considerable experience in managing, as well as experience with credits, as for fifteen years prior to his association with the McGraw Tire & Rubber Company he acted as office and store manager for the M. Oppenheimer, clothing manufacturers, of Pittsburgh, Pa. For a number of years he had charge of their large retail store in the city of Canton, Ohio.

### Miller Opens New Branches

The Miller Rubber Co., of Akron, announces the opening of new factory branches in Philadelphia, Detroit and Grand Rapids for the wholesale distribution of Miller Geared-to-the-Road tires.

The Philadelphia branch is temporarily located at 1427-1433 Vine street. Eventually the branch will be housed in a specially built building on Broad street. G. W. Helman, Philadelphian by birth and a conspicuous figure in the city's business life, has been made manager for the Miller interests. He has devoted the last ten years to the merchandising of automobile tires.

The Detroit branch is temporarily located at 26-38 East Congress street and will be moved to a new building to be erected in the center of the automobile district. C. F. Faro, who has been chosen Detroit manager spent several years at the plant of the Miller Rubber Co. before going to the Miller organization in Chicago. From the latter city he was transferred to Detroit.

L. B. Herrick, who has for some time been manager of the Miller salesrooms in Grand Rapids has been made manager of the new Grand Rapids branch which is located at 21 West Fulton street. The building at this address will be rebuilt and refurnished to suit the needs of the Miller organization.

### Goodrich Rubber Shows Condition

The B. F. Goodrich Rubber Co. has given out a statement of its financial condition dated March 1, 1920, showing total assets and liabilities of $40,322,639, which compares with $22,573,089 for the previous year. The two largest items are merchandise and material $16,642,003, and cash debts receivable, $22,785,006, both of these being a gain from the respective figures of 1919, $9,152,372 and $12,745,451.

### Firestone Canadian Rim Plant

Announcement is made of the establishment of a rim plant in Hamilton, Ont., by the Firestone Tire and Rubber Co., to take care of the greatly increased rim business in Canada. The new plant will adjoin the present Firestone tire factory.

# Business Conditions in the Trade

*Fisk Business for 1919—Federal Rubber Increases Capital—Miller Sales Increase—Goodrich Notes Offered to Public—Mason Sales for March—Col. Colt Optimistic*

### Fisk Business for 1919

The annual statement of the Fisk Rubber Co., Chicopee Falls, Mass., which has just been issued shows the net profits for 1919 to be $4,956,685 and the net sales $43,613,975 with a surplus of over eight millions, almost double the previous surplus. This compares with net profits of $3,760,280 and net sales of $36,682,164 for 1918 while the surplus for that year was $4,425,923 and for 1919, $8,295,821.

Total assets and liabilities of $53,389,751 are shown on the condensed balance sheet, against last year's total of $38,728,778. One of the largest increases on the asset side is in the investment item which has been raised from $334,599 to $3,114,102. This new figure is made up of investments as follows: Acushnet Process Co., $260,000; Federal Rubber Co., $1,250,001 (25,500 shares $100 par common of this company, having a book value of $1,092,675, listed on balance sheet for total $1); Ninigret Co., $1,594,100; Miscellaneous, $10,000.

Total capital stock outstanding is given at $30,264,000, consisting of: seven per cent cumulative first preferred, $14,500,000; seven per cent cumulative second preferred convertible, par $100, $3,509,500; common, 490,180 shares outstanding, $12,254,500. No dividends were paid on the common last year. Dividends on preferred were paid as follows: first, $755,297; second, $300,192. Estimated provision for Federal taxes for 1919 as deducted is $962,029.

**Balance Sheet, December 31, 1919**

ASSETS

| | |
|---|---|
| Land, buildings, equipment, etc. as appraised March 31, 1919, at 1917 values, plus addition for nine months to December 31, 1919— | |
| Less: Reserve for depreciation | $9,449,504.39 |
| Good will | 8,000,000.00 |
| Investments | 3,114,101.99 |
| Inventories | 18,499,827.16 |
| Merchandise in transit | 1,447,098.05 |
| Tires in use under mileage contract | 35,432.26 |
| Notes and accounts receivable, less reserve | 9,021,664.87 |
| Collateral notes from employees for subscriptions to stock | 43,659.77 |
| U. S. Liberty bonds, at market (see contra) | 1,752,963.30 |
| Cash in banks, on hand, and in transit | 1,541,634.89 |
| Deferred charges | 483,864.74 |
| | $53,389,751.42 |

LIABILITIES

| | |
|---|---|
| Capital stock—total outstanding | $30,264,000.00 |
| Loans payable | 8,875,000.00 |
| Loans payable to purchase U. S. Liberty bonds | 1,376,000.00 |
| Accounts payable | 2,268,911.20 |
| Accrued wages | 79,964.51 |
| Provision for federal taxes for 1919 | 962,028.58 |
| Reserve for insurance liability assumed by company | 115,262.36 |
| Reserve for mileage guarantee | 186,583.60 |
| Excess of appraisal value of capital assets over book value at March 31, 1919 | 966,179.68 |
| Surplus | 8,295,821.49 |
| | $53,389,751.42 |

### Federal Rubber Increases Capital

New financing of the Federal Rubber Co., Cudahy, Wis., a subsidiary of the Fisk Rubber Co., is revealed in the underwriting of $2,000,000 seven per cent first preferred stock. Including this issue the company will have first preferred stock outstanding amounting to $4,751,500. Sales are described as having shown a consistent and rapid growth, increasing from $4,613,557 in 1916 to $13,964,584 in 1919. For January, 1920, the company reports net earnings, before providing for Federal taxes, of $329,394.

### Miller Sales Increase

Sales for the month of March of the Miller Rubber Co., of Akron, totalled $3,600,000 according to the company's report. This is an increase of 1,200 per cent in five years or an annual average sales increase of 240 per cent.

Total sales for 1919 were $26,476,211. An increase of nearly $11,000,000 over the previous year. At the present rate the sales total for 1920 will be $50,000,000.

The company now claims for its cord automobile tires an average mileage of 15,000 and for its fabric 7,500. The Akron plant covers twenty-four acres, has 1,012,162 square feet of floor space in twenty buildings and employs 6,000 workmen. The capitalization of the Miller Rubber Co. was recently increased to $60,000,000 to care for an oversold condition.

### Goodrich Notes Offered Public

The $30,000,000 five-year seven per cent convertible gold notes of the B. F. Goodrich Co., authorized recently are now being offered to the public for subscription through a syndicate of New York bankers. The notes are in denominations of $1,000, $500 and $100 and are redeemable at the option of the company at 103, 102 and 101 plus interest during the periods on or before April 1, 1923, 1924 and 1925, respectively. The notes carry warrants entitling holder to purchase common stock at $80 per share at the rate of 12½ shares for each $1,000 par value of notes, up to and including March 31, 1922. After that date and until maturity, the notes are convertible at par into common stock at $80 per share.

### Mason Sales for March

Sales of the Mason Tire & Rubber Company for the month of March were $1,067,000. This was the largest single month in the history of the company, and carries out the prediction of the management made at the last annual meeting of stockholders, namely, that before the present calendar year is over sales will be at the rate of more than $1,000,000 a month. Sales for the present quarter, ending April 30, will be between $2,000,000 and $2,500,000.

The Mason Tire & Rubber Company absorbed the Mason Cotton Fabrics Company on March 31, this now being known as the Textile Division of the Rubber Company. It is a completely equipped, modern fabric mill with spinning and weaving units, having approximately 125,000 feet of floor space, is of steel and concrete construction, and will produce 40,000 pounds of tire fabric per week when in full production. The mill will go into operation about May 1.

### Col. Colt Optimistic

Col. Samuel P. Colt, chairman of the Board of Directors, made the following statement to the stockholders of the United States Rubber Company at the annual meeting held at New Brunswick, N. J., April 20, 1920:

"Your Chairman feels that our Stockholders have cause to be proud of the showing of our Company for its banner year 1919, as set forth in the Annual Report.

"The business of all Departments of your Company is growing beyond precedent and your Directors are striving in all ways through new construction and extensions to keep pace with its growth. Few perhaps realize the part being played by the *automobile*, the *auto truck*, and the *auto bus* in the transportation of both passengers and freight. Forty trucks left last week to carry tire fabrics from the cotton mills in Rhode Island to the Tire Mills in the West. All of these vehicles are equipped with *rubber tires*, today one of the chief products of the United States Rubber Company.

"With the improvements in the highways of our Country that are rapidly being made (as an illustration the great 'Lincoln Highway') traffic will be moved more and more by *rubber shod* vehicles and less and less by cars and trains over fixed iron tracks.

"The tire business of the country in 1914 was $300,000,000, and in 1920 it is estimated will be not less than $1,200,000,000. Notwithstanding this phenomenal growth, I predict even a more startling increase in the future.

"We see, therefore, the conditions confronting us and shall strive our utmost to be prepared to cope with them."

### Cotton Transported by Trucks in Strike

Both the Firestone and Goodyear plants in Akron were supplied with cotton during the recent railroad strike by motor deliveries from the East. On the Westward trip the caravans carried cotton and on the return trips tires were transported for the Eastern branches of the two companies. It was by this method that production was kept normal in both plants.

Firestone used an emergency fleet of fifty five-ton trucks working in several units between Akron and the cotton mills in Worcester, New Bedford and other points in Massachusetts making in all a round trip of 1500 miles.

Over two million dollars worth of cotton was transported in the 80 Goodyear trucks which were divided into five caravans. Truck companies operating between Boston and New York supplied the trucks for this undertaking and it is understood that they received one dollar a mile, or a total of $30,000 for the round trip. The operation of trucks in this manner enabled the companies to become independent of railroads in keeping their plants in continuous operation during strikes.

### New House Organ Issued

The first issue of the Stronghold, published by the Rubber Products Co., Barberton, Ohio, has made its appearance with the April number. The first number is a neat eight-page issue devoted to closer cooperation between the home office and the sales force. It will circulate among the company branches as well as among the dealers and distributors.

### Goodyear Hall Opened

Vast sums of money are being spent by industrial enterprises for the welfare of their employes, but perhaps nowhere in the world is there a concern doing more for its employes than the Goodyear Tire & Rubber Company of Akron, which now has 33,000 on its Akron payroll.

As illustrative of this company's attitude towards its workers, Goodyear Hall, the new two and a half million dollar recreational institution and industrial university of the company, will be formally dedicated on Saturday, April 17. It is said to be one of the most pretentious buildings ever erected by a concern solely for the welfare of its employes.

The principal feature of the new building is the establishment of Goodyear's Industrial University. With a faculty of 117 college professors it already has an enrollment of 4,700. The university has sixty-five class rooms, four large laboratories and large assembly and lecture rooms. All forms of study are embraced in the curriculum from rudimentary grade school classes and Americanization classes for the foreign-born, to standardized collegiate post graduate courses for those desiring to round out incompleted college careers. A. C. Horrocks, of Cleveland, is dean of the University. Two of the leading faculty members are Dr. John A. Custer, of Lawrence College, Wis., and Prof. W. A. Emery, of Carnegie Institute, of Technology, at Pittsburg, Pa. The 600 classes, arranged to accommodate employes from all three daily eight-hour shifts, are open to bona fide employes without tuition charges.

The hall also includes a large auditorium, a gymnasium which ranks in size and completeness of equipment with the greatest indoor athletic stadiums of the country, a cafeteria to feed 8,000 daily, twelve bowling alleys, six rifle ranges, dormitory rooms and locker rooms. The company's entire educational and recreational program is calculated to carry out its idea of fostering the spiritual and intellectual as well as the material, and of making its employes men and women of independent thought.

The formal opening of the university is regarded as an event of nation-wide importance. The institution is without duplication in the world. Prominent statesmen, industrial experts and educators will attend the formal dedication.

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### Mid-West Rubber Association Meeting

The April meeting of the Mid-West Rubber Manufacturers Association was held at the Chicago Athletic Association on Tuesday, April 13, and was attended by fifty members. Luncheon was served at noon after which remarks were made by quite a number of those present, and many points of interest to the members of the trade were brought out.

President John T. Christie occupied the chair, and urged upon all those present the importance of extending the membership of the Association, so as to accomplish the aims for which it was organized. He pointed out that the Mid-West Rubber Manufacturers Association was dependent entirely upon its income from Initiation Fees and Annual Dues, and that in order to develop the organization and put it upon firm financial footing every member would have to constitute himself a special membership committee, and try to bring at least one new member to each monthly meeting. If this could be done, there would be no question about the success or the influence of the organization. He was very glad to announce that the Board of Directors had recommended favorable action upon the following applications for membership:

REGULAR

Braender Rubber & Tire Co., Rutherford, N. J.
The Meyer Rubber Co., Columbiana, O.
The India Tire & Rubber Co., Akron, O.
Master Tire & Rubber Co., Dayton, O.
The Cleveland Rubber Corporation Co., Cleveland, O.
Fort Wayne Tire & Rubber Mfg. Co., Fort Wayne, Ind.
Zenith Tire & Rubber Co., Cleveland, O.
Iowa Cord Tire Co., Des Moines, Iowa.
The National Tire & Rubber Co., East Palestine, O.
The Spreckels Savage Tire Co., San Diego, Cal.

JOHN T. CHRISTIE

ASSOCIATE.

Belle-Watson Co., Inc., New York, N. Y.
Bloomingdale Rubber Co., New York, N. Y.
Sessions Engineering Co., Chicago, Ill.
General Electric Co., Chicago, Ill.
The Herman Tire Bldg. Machine Co., Lancaster, O.
The H. B. Bixler Co., Akron, O.
Meyer & Brown, Inc., New York, N. Y.
Towar Cotton Mills, Inc., Niles, Mich.
The Banner Machine Co., Columbiana, O.
Albert E. Burr Co., New York, N. Y.
J. T. Johnstone & Co., Inc., New York, N. Y.
Rubber Importers & Dealers Co., Inc., New York, N. Y.
E. S. Kuh & Valk Co., New York, N. Y.
L. Littlejohn & Co., Inc., New York, N. Y.
Baird Rubber & Trading Co., New York, N. Y.
Brander & Curry, Inc., New York, N. Y.
Manhasset Mfg. Co., Providence, R. I.

Upon motion duly adopted the above members were unanimously elected.

Among those who spoke briefly at the meeting were:

Ole Hibner, of the Cleveland Rubber Corporation Co., Cleveland, O.
R. Paul McElrath, of the McElrath Tire & Rubber Co. of Ravenna, O.
F. M. Hutchinson, of the Braender Rubber & Tire Co., Rutherford, N. J.
W. F. Harrah, of the National-Standard Co., Niles, Mich.
H. B. Bixler, of the H. B. Bixler Co., Akron, O.
W. H. Herman, of the Herman Tire Bldg. Machine Co., Lancaster, O.
Harry Hunter, of the Hunter Dry Kiln Co.
J. C. Brown, of the Fort Wayne Tire & Rubber Mfg. Co., Fort Wayne, Ind.
G. G. Yule, general sales manager of the Falls Rubber Co., Cuyahoga Falls, O.
C. A. Brunner, of the General Electric Co., Chicago, Ill.
W. E. Lape, of the Barrett Co., Chicago, Ill.

The remarks of Edward S. Babcox, vice-president of the Akron Advertising Agency, Inc., in which he made some comments and suggestions in respect to the immediate future of the demand for tires were listened to with great interest.

### Rubber Imports for March

The figures of the Rubber Association of America show a further increase in crude rubber importations during the month of March. The market has shown considerable depression recently due to the fact that the factory output has been rather light, while the quantity of rubber arriving here has been of record proportions.

Following are the detailed figures showing receipts of rubber here in March:

PLANTATIONS

| From— | Tons. | From | Tons. |
|---|---|---|---|
| Liverpool | 68 | Melbourne | 6 |
| London | 4,444 | Sourabaya | 481 |
| Marseilles | 29 | Tuluk Anson | 16 |
| Rangoon | 9 | Penanag | 1,769 |
| Singapore | 13,292 | Pt. Swettenham | 368 |
| Colombo | 5,720 | Japan and others | 384 |
| Deli-Belawan | 1,161 | | |
| Batavia | 796 | | |
| Total | | | 28,533 |
| Manicoba and Matta Grosso | | Manicoba | 3 |

AFRICANS

| | | | |
|---|---|---|---|
| Marseilles | 21 | Havre | 36 |
| Bordeaux | 216 | Lisbon | 215 |
| Liverpool | 26 | | |
| Total | | | 514 |

CENTRALS AND GUAYULE

| | | | |
|---|---|---|---|
| Centrals (Mexico & Central America) | 23 | Guayule (Mexico) Eagle Pass by rail | 114 |
| Total | | | 137 |

PARAS

| | | | |
|---|---|---|---|
| Manaos | 175 | Pernambuco | 23 |
| Para | 1,968 | Iquitos | 290 |
| Peara | 1 | | |
| Total | | | 2,457 |

GUMS, WASTE RUBBER, ETC., IMPORTED FROM VARIOUS SOURCES

| | | | |
|---|---|---|---|
| Waste | 1,252 | Miscellaneous gums | 983 |
| Balata | 13 | | |

COMPARISON 1919-1920

| | March, 1919. | March, 1920. | Total importations for mos. ending March 31, 1920. |
|---|---|---|---|
| Plantations | 23,680 | 28,533 | 76,013 |
| Paras | 3,808 | 2,463 | 7,539 |
| Africans | 337 | 514 | 1,893 |
| Central | 211 | 23 | 399 |
| Guayule | 187 | 114 | 148 |
| Manicoba & Matto Grosso | ... | 3 | 3 |
| Total | 28,223 | 31,650 | 85,995 |

| From— | Arrived at— | Tons. |
|---|---|---|
| Singapore | New York | 12,158 |
| Singapore | San Francisco | 1,061 |
| Singapore | Seattle | 73 |
| Penang | New York | 812 |
| Penang | Seattle | 166 |
| Penang | San Francisco | 791 |
| Batavia | San Francisco | 271 |
| Batavia | New York | 525 |
| Sourabaya | San Francisco | 160 |
| Sourabaya | New York | 321 |
| Japan and others | Seattle | 175 |
| Japan and others | San Francisco | 209 |
| Rangoon | New York | 9 |
| Tuluk Anson | New York | 16 |
| Colombo | New York | 5,720 |
| Marseilles | New York | 19 |
| Deli-Belawan | New York | 1,161 |
| Melbourne | New York | 6 |
| London | New York | 4,444 |
| Liverpool | New York | 68 |
| Port Swettenham | New York | 368 |
| Total | | 28,533 |

ARRIVALS OF PLANTATIONS BY PORTS

| | | |
|---|---|---|
| Atlantic Ports— | | |
| New York | 25,627 | |
| Pacific Ports— | | |
| San Francisco | 2,492 | |
| Seattle | 414 | |
| | 2,906 | |
| | | 28,533 |

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### New Haven Sheradizing Moves

The New Haven Sheradizing Co., New Haven, Conn., will shortly remove to Hartford, according to a recent announcement. In the new plant the company will have a greatly increased space and very good shipping facilities are provided.

# News From the Rubber Metropolis

*Announcement Is Made of the Expansion of a Number of Akron Firms—McGraw Sales for 1919—Miller Gives Factory Employes Vacations—Akron Stock Prices*

### Akron Firms Expanding

(*Special Akron Correspondence*)

The continual expansion on the part of Akron rubber companies lends credence to the report that the Firestone Tire & Rubber Co. is about to follow the Goodyear to the Los Angeles field. Announcement of plans for a Firestone factory on the Pacific coast, it is said in well informed circles, would not be a surprise.

Firestone recently made official announcement of plans for construction of a $1,000,000 plant in Singapore by a subsidiary company. This plant will condition the rubber direct from the Straits Settlements plantations and will compress it in order to render transportation easier and less costly. It also will clean the rubber so that the crude product will be ready for use when it reaches the Akron factory.

American machinery is to be designed for the factory which, it is said, will be the first of its kind in the Far East.

Another announcement of the branching out of an Akron company comes from the Goodyear Tire & Rubber Co. in the form of a factory for Rio de Janeiro, Brazil. Negotiations have been completed for 200 acres of land and construction work has begun. The plant will be completed in eighteen months. Plans for this factory, it is said, have been held up two years by the war. The plant will be built to turn out between 3,000 and 5,000 tires a day.

Training of the personnel for the Brazilian factory will be started at once in the Akron shops of the Goodyear. Employes who desire to go to South America can join classes in Portuguese, which have been opened. It is stated that over 3,000 will be employed in the new plant.

Goodyear also continues active work in enlarging the Akron factory. The new steel products plant, 250 by 600 feet, is under construction and will employ 500 men and will turn out 10,000 rims a day.

The Miller Rubber Co. is also at work on new additions. These include a five-story brick structure to cost $500,000; another brick addition to the factory to cost $325,000, and another smaller building to cost $30,000.

Practically every other rubber company in the Akron district is making additions, large and small.

### Firms to House Employes

(*Special Akron Correspondence*)

Akron rubber companies are again bending every effort to provide housing accommodations for their thousands of new employes.

The Goodyear Tire & Rubber Co. took a big step forward recently when officials ordered the construction of a large dormitory to house girl workers. Right on the heels of this step the Goodyear began the erection of a cantonment, patterned after the army camps in this country, were over a thousand men workers can live. In this cantonment there will be sleeping quarters, kitchens, dining halls and recreation rooms. The company is also building homes for its workers as rapidly as possible.

The Firestone Tire & Rubber Co., through a subsidiary, is planning to construct 200 homes in Firestone Park this year. In addition the company will build several rows of terrace dwellings, which will be rented. It is planned to provide living quarters for 100 families in these terraces.

Akron business men are united in their effort to solve the housing problem which more than anything else is restricting the growth of the city and its industries.

### McGraw Sales for 1919

(*Special Akron Correspondence*)

Sales of the McGraw Tire & Rubber Co. for the year ended November 30, 1919, just made public, were in excess of $7,000,000, while net profit after setting aside substantial reserves and liberal charges for depreciation amounted to $380,392.

This statement represented the company's first year's operation under its new plan of manufacturing and distribution. During 1919 the company established fifteen branch offices to sell the company's product direct to dealers. The plant is at East Palestine.

The balance sheet shows $357,682 cash, $3,732,708 inventory while total current assets are $4,996,742, which compare with $1,521,948 current liabilities. The surplus and profits account shows $1,621,084. The statement follows:

Certified by Ernst & Ernst, Certified Public Accountants.

ASSETS.

| | | |
|---|---|---|
| Current— | | |
| Cash on hand, in bank | $357,682 | |
| Notes and acceptances receivable | 111,361 | |
| Accounts receivable | 794,989 | |
| Inventory (finished, in process and raw material) | 3,732,708 | $4,996,742 |
| Permanent assets (after depreciation) | | 1,091,331 |
| Other assets— | | |
| Employers' stock subscriptions, claims and other real estate | | 215,105 |
| Deferred and prepaid expense accounts | | 59,026 |
| Total | | $6,362,204 |

LIABILITIES.

| | | |
|---|---|---|
| Current— | | |
| Notes and acceptances payable | $1,124,009 | |
| Accounts payable | 203,893 | |
| Accrued dividend, taxes and interest | 104,045 | $1,521,949 |
| Reserves for adjustments, contingencies and dividends | | 222,631 |
| Nominal— | | |
| Capital stock: Preferred authorized | 5,000,000 | |
| Unissued | 2,500,000 | $2,500,000 |
| Common authorized, 100,000 shares, no par value | 500,000 | |
| Less: Reserved for employes | 3,460 | 496,540 |
| Surplus and profits | | 1,621,084 |
| Totals | | $6,362,204 |

### Miller Gives Employes Vacations

(*Special Akron Correspondence*)

Miller Rubber Co. employes who have been in continuous service for two years or more will be given vacations with full pay, it has been announced by the company. Those who have been with the company for two years will be entitled to five days and those who have been there for three years will get ten days off. If they work through their vacations they will receive double pay.

This move, it is believed, is taken as a means to attract workers to the Miller Rubber Co. and to keep the working force as stable as possible.

### Akron Stock Prices

(*Special Akron Correspondence*)

As a general rule stocks listed on the Akron rubber exchange have shown consistent strength during the past two weeks. The Ohio tax listing day falling on April 11 tended to make the demand for non-assessable securities stronger than usual and the prices advanced as a result.

Firestone common was one of the features of the first part of April, climbing nearly 30 points to 194, only to drop back to 185 within a few days.

Miller common, going ex-dividend, dropped from 200 asked to 188.

Goodyear remained around the 390 mark for the first half of the month.

Following are quotations on April 13:

| | Bid. | Asked. |
|---|---|---|
| American R. & T. com | 88 | 91 |
| Amazon Rubber | .. | 101 |
| Firestone com. | 183 | 188 |
| *Firestone 6 pct. pfd | 95½ | 96½ |
| Firestone, 7 pct. pfd | 97 | 98 |
| General, com. | 600 | .. |
| General, pfd. | 100 | 100½ |
| B. F. Goodrich com | 69 | 71 |
| B. F. Goodrich pfd | 94½ | 95½ |
| Goodyear com. | 385 | 395 |
| Goodyear 1st pfd | 99½ | 100 |
| India Rubber | 185 | 200 |
| Kelly Springfield | 131 | 133 |
| Mason com. | 30 | .. |
| Mason, pfd. | .. | 75 |
| Marathon com. | 50 | 53 |
| *Miller com. | 183 | 188 |
| Mohawk com. | .. | 335 |
| Portage com. | 95 | 98 |
| Portage pfd. | .. | 86 |
| Republic com. | 3½ | 4 |
| Republic 1st pfd | .. | 65 |
| Republic 2nd pfd | 35 | 40 |
| Rubber Products | 110 | 125 |
| *Star Rubber com | 200 | 300 |
| Swinehart com. | 80 | 90 |
| *Swinehart pfd. | .. | 90 |
| Phoenix Rubber, com. | .. | 23 |
| Phoenix Rubber, pfd | .. | 90 |
| Standard Tire com | 200 | 225 |
| Standard pfd. | .. | 95 |

* Ex-dividends.

### Excel Completes Factory

The new factory building of brick and steel construction soon to be occupied by the Excel Rubber Company, First Avenue, Wadsworth, Ohio, is practically complete and machinery is being placed. The entire equipment has arrived. The factory is built so that when it becomes necessary, additions can be built with the minimum of inconvenience and expense.

The new plant is built of brick with steel sash, two stories in height. It covers 4,000 feet floor space. "Flint Cord" tires and Excel fabric tires are to be manufactured besides a full line of accessories such as reliners, blowout patches, repair kits, etc. Tubes will also be made.

Operations will begin about May 15th. H. D. Mench, vice-president and salesmanager, states that the output for the first year is practically all sold.

### Imperial Rubber Incorporates

(*Special Akron Correspondence*)

Orrville, Ohio, twenty miles south of Akron, is to have a new rubber plant, the Imperial Rubber Co., which was recently incorporated at $25,000. The company has purchased the J. D. Mullet factory buildings there and has started to install machinery. H. H. Hoberg, of Ravenna, Ohio, is general superintendent.

### Miller Sales Increase

(*Special Akron Correspondence*)

Miller Rubber Co. sales for the first two months of the present year were $6,021,000, as compared with $3,138,000 for the correspondent period of 1919. This announcement by the Miller in connection with recent refinancing is an indication of the great growth of the Akron tire industry.

### Cooperative Cotton Marketing

The organization of the Southern cotton growers into a co-operative marketing organization, formed along the lines of the California fruit associations, was completed at a meeting of the American Cotton Association held at Montgomery, Ala., recently. By June 15, cotton growers of the South will be well on their way toward marketing their crops on the co-operative plan of direct selling. Growing sentiment in the Southern cotton belt for a solution of the cotton price problem came to a head at this meeting when delegates to the convention enthusiastically adopted a recommendation from a committee to the effect that they market their cotton through a central selling body.

Col. T. J. Shackelford, of Georgia, has been elected attorney for the association, and will look out after the growers' interests in Washington.

In urging the adoption of the central marketing plan, the committee of the association said: "The cotton producers of the South are suffering from a vicious system of marketing, the outstanding defects of which are as follows:

"First, lack of information as to marketing conditions; second, want of knowledge of the grade and staple of cotton when the farmer sells it; third, selling in small and mixed lots; fourth, selling only to local and immediate buyers.

"These conditions, either singly or collectively, result in the selling of cotton largely without reference to grade, staple, and a commercial value, the general rule being that the highest bidder in the local market gets the cotton. Cotton of the better grades in many cases has commanded no premium over middling. Cotton of the lower grades has often sold for higher prices than cotton of the better grades, and cotton of the same staple has sold at enormous differences in the same market on the same day, these differences often representing the entire margin of profit, or worse still, the pitiful spectacle of actual loss.

"Co-operative marketing is no experiment. That it is the successful remedy for such marketing evils is shown by the experiences not only of farmers in Ireland, Denmark, and other European countries, and truck growers, prune and raisin growers, and other large marketing organizations in America, but also by the experience of an increasing number of co-operative cotton marketing associations in the South. Entering a new field these associations almost necessarily have been local in scope and limited in number and have lacked proper co-ordination of their activities. Still to them belongs credit of the pioneer who shows the way. Conditions now make it imperative that cotton producers in general profit by the example of these associations and put into effect on a South-wide scale the principles whose value have been so clearly shown."

Much interest had attached to reports that the association was to recommend to its members reduction of acreage this year. A resolution along this line read: "Be it resolved, that the first duty of the farmers of the South is to make a living for themselves and families. To be sure of this living, they should plant and properly cultivate sufficient food and feed crops to adequately feed their families and livestock. We especially urge that their food and feed crops be given first consideration, after which they should plant all the cotton that they can properly cultivate and gather, and

"Be it further resolved, that owing to conditions brought about by the scarcity and inefficiency of hired labor and lateness of the planting season, we find it unnecessary to even mention the reduction of the acreage of cotton as the above facts will automatically reduce the acreage planted in cotton. It will be many years when the South can produce a crop of cotton in any way sufficient to meet the world's demand.

American manufacturers of cotton goods are making huge profits on manufactured cotton goods at the present time, it was stated at the convention, and the farmers decided to demand a price of sixty cents per pound, basis middling, for cotton to be sold these manufacturers in the future. Even at such a price, the manufacturers will be able to make handsome profits, the growers state.

"The world's demand for the manufactured products from cotton has placed the price of the manufactured products far above a just ratio of the present price paid the farmers for cotton" reads the resolution demanding sixty-cent cotton. "The spinners should pay the farmers a price of not less than sixty cents per pound for cotton, basis middling, which price would enable them to make enormous profits on the manufactured products at the present price of said manufactured products."

### Cupples Forms Service Club

Many methods of remuneration for employes who have been faithful and loyal have been tried in recent years, some of which have been successful, while others have failed.

Most of the failures have occurred in cases where a large percentage of the employes were foreigners, many of them illiterate and not able to understand the details of the systems. When labor of this character is employed, it is only interested in the daily wage, and any attempt on the part of the employers to create a fund of any kind to be distributed annually or semi-annually, invariably causes a feeling that wages justly earned are withheld illegitimately, used only as a lure to insure increased production or length of service.

Many employers who employ labor of a higher character have been able to establish systems whereby a part of the net earnings of capital is divided among the employes from time to time, commensurate with the service rendered.

The Cupples Company, of St. Louis, Mo., have a system which has been given a thorough trial for three years and found to be not only practical, but satisfactory to all parties concerned.

During the early part of 1917 the president of the company, Harry B. Wallace, originated a plan of forming a Loyalty and Service Club with employes only as members. A constitution was adopted and twelve of the most capable and loyal employes were selected as charter or managing members.

The Loyalty and Service Club has been a constant stimulant to all employes, no feeling existing on account of one employe having more bars than another, as higher graded employes are at all times constructively endeavoring to help their lower graded associates advance, ever keeping in mind the responsibility of each position where planning and thinking are essential to success.

Such a marked improvement has occurred in the harmony, loyalty and service of the company that for the first six months of 1918 and 1919 an extra dollar per bar was given to members, and for the last six months two extra dollars per bar were given, making a five bar member's remuneration $150 per year—all of this being in excess of any increase in salary which might have been given.

It can also be stated that all salaries are judged by the results of the interest shown in Loyalty and Service Principles.

As a further reward for closer co-operation of the Loyalty and Service Club, the company announced as a New Year's surprise the taking out of an industrial insurance policy covering the lives of all members of the club, the amount of insurance on each being based on the standing in the club.

Mr. Wallace is a great believer in employers taking an active interest in athletic sports, the Cupples Company having a bowling league of eight teams, rolling one night of each week, the entire prize fund being donated by the company.

Two baseball teams will represent the company in the Municipal League the coming season, being made up of employes of the company only.

A golf tournament will be held during the summer, Mr. Wallace donating a valuable cup, to be contested for until won by one person three times. Mr. Wallace was once a star baseball player on the Yale University team and is now a prominent golfer.

### United States Elects Officers

The board of directors of the United States Rubber Company met on the afternoon of April 22 for purposes of electing officers and committees. As the result of the meeting the following officers, executive committee and operating council were elected for the ensuing year:

Officers: Samuel P. Colt, chairman; Lester Leland, vice-chairman; Charles B. Seger, president; James B. Ford, vice-president; Homer E. Sawyer, vice-president; Elisha S. Williams, vice-president; J. Newton Gunn, vice-president; Ernest Hopkinson, vice-president; W. G. Parsons, vice-president and comptroller; W. H. Blackwell, treasurer; Samuel Norris, secretary; John D. Carberry, assistant treasurer and assistant secretary; Sherwood S. Green, assistant treasurer; H. B. Hubbard, assistant comptroller; W. O. Cutter, assistant comptroller; George E. Smith, auditor.

Executive Committee: Samuel P. Colt, chairman; Lester Leland, Charles B. Seger, James B. Ford, Walter S. Ballou, Nicholas F. Brady.

Operating Council: Charles B. Seger, chairman; Homer E. Sawyer, Elisha S. Williams, J. Newton Gunn, Ernest Hopkinson, W. G. Parsons.

### Quarterly Rubber Importations

The following bulletin relative to importations of crude rubber during the first three months of 1920 has been sent by the Mid West Rubber Manufacturers Association to all members:

"Crude rubber statistics for March, 1920, show total importations of 31,650 tons, an increase of 3,427 tons over March, 1919, which was the second largest month of that year, and a falling off of 1,344 tons, from February, 1920, which totaled 32,994 tons, larger than any weight received during any one month of 1919 or so far this year.

"The total weight of crude rubber received during the first quarter of 1920 was 85,995 tons, an increase of 33,081 tons over the weight received during the corresponding quarter of 1919, which was 52,914 tons.

"The importations during 1919 averaged 19,293 tons per month which would give a quarterly average of 57,879 tons. It will thus be seen that the weight received during the first quarter of 1920 exceeds by 28,116 tons the quarterly average for 1919. The figures so far point to a substantial increase in 1920 importations."

# MARKETS

## Manufactured Rubber Goods

NEW YORK, April 21, 1920.

Activity among the manufacturers of rubber goods has been curtailed to a considerable extent by the "outlaw" strike of railroad workers, and many plants ran short of raw materials during the fortnight's tie-up brought about by the desertion of these workers from both their jobs and their unions. The large manufacturers who are in a position to carry large reserve stocks of materials were not so seriously affected, although the coal shortage pinched. However, it appears now as though the railroad troubles were due for a speedy settling, and it is hoped that difficulty from this source will soon be eliminated.

Producing costs of manufactured rubber goods continue on the upward move. Practically all materials, with the exception of rubber itself, have been moving steadily upwards for several weeks past, and there is no end yet in sight. Chemicals and compounding materials are all holding on a firm basis, and the rapid advances in the cotton market preclude any possibility of early reductions in selling prices of the various fabrics used in the industry. Wages likewise show no signs of dropping, rather the other extreme. Despite all these handicaps, however, manufacturers are working hard to increase production sufficiently to take care of the heavy increase in demand.

### *EXPORTS*

The export rubber situation shows no change. The sterling market has shown more strength, due to heavy shipments of gold bullion to the local market from Great Britain, but thus far nothing more in the line of export business has been developed. There is a good call abroad for American rubber goods, but buyers in European countries are unable to finance the shipments they would like to import.

### *BOOTS AND SHOES*

There is a good inquiry for summer rubber footwear reported in the wholesale markets, and late shipments are being speeded up. Manufacturers have been unable to make shipment to jobbers and retailers for some time past, due to the strike on the roads, but heavy shipments are scheduled to go out as soon as the situation eases off. The parcel post service has been called upon to a considerable extent to handle shipments of this character.

### *AUTOMOBILE TIRES*

Recent advances in tire prices have not served to cut down the demand, and there is a good demand reported from the distributing trade. Motorists are getting their cars out now for the spring and summer motoring season, and are paying particular attention to their rubber, in view of the general high prices ruling now. The advance in gasoline prices is not expected to cut down motoring to any extent this summer.

Leading makers of tires are doing a good business at the present time, and the smaller manufacturers are also coming in for their share of the general prosperity. Some of the smaller manufacturers market their tires through the wholesale grocery trade, this business being especially pronounced in the Southern states, where many wholesale grocers carry a full line of automobile tires.

### *MECHANICAL GOODS*

There is a good call for garden hose this spring, and the market is showing more signs of activity. Prevailing high prices for foodstuffs will induce more consumers to plant their own gardens this year.

Thus far, no large orders for air brake hose and other railroad equipment have been reported placed, but the trade is waiting for the railroad managements to complete their overhauling and inventorying of stocks. The roads do not yet know just where they stand, in view of the fact that much of their rolling equipment was in use by roads in distant parts of the country when the roads were returned. Some time must be allowed for the unscrambling process to be completed.

Demand for belting is reported as routine. Labor troubles and railroad difficulties tend to restrict operations at the mines and in factories, and wear and tear on belting is consequently reduced. Some demand for marine specialties is reported.

### *MISCELLANEOUS*

From the present outlook, it looks like another poor year for the manufacturers of rubber jar rings. The shortage of sugar is becoming increasingly serious, and prospects for any large volume of home canning and preserving are growing dimmer and dimmer from day to day.

Manufacturers of bathing caps are doing a big business this season. Demand is chiefly for the fancy grades of caps which must necessarily sell for high prices. Makers of toy balloons and other rubber toys and novelties also report an active market for their product.

## Cotton, Yarns and Fabrics

NEW YORK, April 21, 1920.

The cotton market has shown decided strength during the past fortnight, and new high record prices have been scored on both spots and futures. The conference of the American Cotton Association held at Montgomery, Alabama, largely influenced the market, and the recommendation of members of the association that the balance of the old crop be held for 60 days was responsible for a sharp advance in the local market. The high prices which farmers have been getting for their cotton during the past season have left them in a strong position financially, and there is little doubt of their ability to hold remaining stocks of cotton for 60 days or even longer, until things go more their way.

May cotton is selling up to 42.38 cents per pound in the local market, with July at 40.05 cents, September at 37.10 cents, October at 36.02 cents, December at 35.73 cents, January at 34.80 cents, February at 33.75 cents, and March at 33.87 cents. The market on spot goods in Southern markets, however, is still ahead of the local market. Sales have been made at 40 to 43 cents per pound, and even higher on better stock. Low middling cotton has sold at 34 to 35½ cents per pound at primary points.

### *SEA ISLAND COTTON*

Conditions in the Sea Island district continue unchanged. No change in the estimate of 25,000 to 30,000 bales as the crop for the coming season has been made. Many of the growers have given up the fight against the boll weevil and army worm pests and have turned their attention to the growing of peanuts, or other foodstuffs. The industry is in a very precarious condition at the present time, and the pessimistically inclined believe that the growing of cotton in the Sea Island district is almost a thing of the past. Others believe that after allowing a season or two for the removal of the insect pests, the industry will stage a grand "come back" and once again supply American spinners with large quantities of choice long staple cotton.

### *EGYPTIAN COTTON*

The situation has shown little change. The market at Alexandria has shown some recovery, and spot sellers have consequently advanced their asking prices to a stiff rate. Practically all of the stocks of old crop Egyptian cotton have been sold for export, only 50,000 bales being still unsold on March 12. About 25,000 bales of this lot are Uppers, while the remainder being varieties for which export demand is quiet. Holdings of Egyptian cotton in the American market are fairly large, heavy receipts having reached the Boston market. Large quantities are held in warehouse there, shipment to spinners being impossible due to congested railroad conditions; some being moved by water to New Bedford, however. Spinners of cotton fabrics are taking most of the cotton.

### *AMERICAN EGYPTIAN COTTON*

There is a good demand for Pima and other American Egyptian cotton, but practically the entire crop is sold to spinners of tire fabrics. Growers are steadily increasing operations, and a large

crop is anticipated during the coming season, weather conditions having been favorable save for a slight attack of cold weather a few weeks ago.

### *TIRE FABRICS*

Practically the entire output of tire fabrics at the present time is going to tire makers on a contract basis, there being little or none to be had in any of the spot markets. The market is increasingly strong, higher cotton prices, coupled with high labor charges, putting the market up from time to time. Sea Island fabrics are practically off the market, due to the great shortage of Sea Island cotton, and quotations are not obtainable at the present time.

### *HOSE AND BELTING FABRICS*

There is an active inquiry for hose and belting fabrics reported at the present time. Shipment to manufacturers have been held up for some time past due to the railroad condition, and consignments to manufacturers have been either held up by embargoes or have been sidetracked somewheres along the line and temporarily lost.

### *DRILLS, SHEETINGS AND OSNABURGS*

The advancing market for raw cotton is being reflected in a firmer feeling in the market for cotton goods, and prices on drills and sheetings are quoted higher. The automobile tire trade has been a good buyer in the market some weeks past, while other interests are taking supplies in a hand-to-mouth manner. In addition, there is a good export inquiry prevalent.

### *BURLAPS*

There is a steady call for burlaps reported, but the market is still in an unsettled position as far as prices are concerned. Consumers are taking supplies in a hand-to-mouth manner, and are not inclined to buy far in advance. Heavyweights are held at about 14.50 cents per yard for 10½ ounce stock in lots of 25 or more bales, while on smaller quantities the market is held up to 15.50 cents.

#### TIRE FABRICS

| | sq. yd. | Nominal |
|---|---|---|
| 17¼-ounce Sea Island, combed. | | |
| 17¼-ounce Egyptian, combed | | 2.35@2.50 |
| 17¼-ounce Egyptian, carded | | 2.25@2.40 |
| 17¼-ounce Peelers, carded | | Nominal |
| 17¼-ounce Peelers, combed | | 2.25@2.35 |

#### DUCKS

| | | | |
|---|---|---|---|
| Belting (pound basis) | lb. | .78½ @ | .82 |
| Hose (pound basis) | | .78½ @ | .82 |
| Enameling | | .88 @ | .. |
| Shoe Ducks | | .90 @ | .92 |
| Single filing | yd. | .35 @ | .38 |
| Double filing | | .38½ @ | .40 |

#### DRILLS

| | | | |
|---|---|---|---|
| 37-inch 2.35-yard | yd. | .32½ @ | .33 |
| 37-inch 2.75-yard | | .30 @ | .. |
| 37-inch 3.00-yard | | .29 @ | .. |
| 37-inch 3.25-yard | | .28 @ | .. |
| 37-inch 3.50-yard | | .26 @ | .26½ |
| 37-inch 3.95-yard | | .24½ @ | .. |
| 37-inch 2.00-yard Southern | | Nominal | |
| 37-inch 2.00-yard Northern | | Nominal | |
| 40-inch 2.40-yard Southern | | Nominal | |
| 40-inch 2.40-yard Northern | | Nominal | |
| 52-inch 1.90-yard Southern | | Nominal | |
| 52-inch 1.90-yard Northern | | Nominal | |

#### SHEETINGS

| | | | |
|---|---|---|---|
| 40-inch 2.35-yard | yd. | .. @ | .. |
| 40-inch 2.50 yard | | .35 @ | .. |
| 40-inch 2.85-yard | | .33 @ | .33½ |
| 40-inch 3.00-yard | | .. @ | .. |
| 40-inch 3.25-yard | | .. @ | .. |
| 40-inch 3.75-yard | | .28 @ | .28½ |
| 40-inch 3.60-yard | | .29 @ | .30 |
| 40-inch 4.25-yard | | .24 @ | .25 |

***Note.*—In view of the unsettled conditions prevailing in the market at the present time, the prices quoted above are more or less nominal, and are not guaranteed.**

#### BURLAPS

**(Carload lots)**

| | | Cents Per Yard | |
|---|---|---|---|
| 7 -ounce | 40-inch | .. @ | .. |
| 7½-ounce | 40-inch | .. @ | .. |
| 7½-ounce | 45-inch | .. @ | .. |
| 8 -ounce | 36-inch | .. @ | .. |
| 8 -ounce | 40-inch | 9.40 @ | 9.75 |
| 8½-ounce | 40-inch | 10.00 @ | .. |
| 10 -ounce | 36-inch | .. @ | .. |
| 10 -ounce | 40-inch | 14.75 @ | .. |
| 10 -ounce | 45-inch | Nominal | |
| 10½-ounce | 40-inch | 14.50 @ | 15.50 |

# Chemicals and Compounding Materials

NEW YORK, April 21, 1920.

The market is well held, and there is a steady tone ruling in all branches. Practically all of the price changes which have occurred during the past fortnight have been upward, but in the trade it is believed that this movement cannot long continue.

Manufacturers are doing their utmost to hold the market steady at about the present basis, and are holding off from trying to bull the market, realizing that prices have gone high enough. Demand from the domestic trade is of sufficient volume to take care of all of the production of home manufacturers, and there is consequently little worry over the unfavorable export situation.

### *BENZOL*

There is a strong market ruling on spot benzol, selling prices being considerably above those asked by producers, due to the extreme shortage which has developed. Second holds are offering the 90 per cent at about 27 cents per gallon, compared with a producers' price of 25 cents per gallon. Pure benzol is not to be had on the re-sale market in any quantities, and is held by producers at quoted prices.

### *LITHARGE*

Demand for litharge continues ahead of the supply, and the market is firmly maintained as quoted. No further advances are anticipated by the trade unless the market for pig lead should take some sudden upward turn. Buyers who want stocks for immediate consumption are offering premiums for spot goods in some instances, but producers are unable to pay any attention to this business, being forced to devote their entire production to keeping up contract deliveries.

### *WHITING*

There is a strong tone featuring the market, and producers are unable to take care of all the business offering, due to the shortage of English cliffstone, only meagre imports coming through at the present time. Prices are held at $1.40 for commercial, $1.45 for gilder's bolted, and $1.55 for extra gilder's bolted; American Paris white holding at $1.75.

### *BARYTES*

Producers are still behind in their deliveries, due mainly to the shortage of freight cars, and the situation has been further set back by the strike of railroad workers. At present all contract prices are withdrawn by producers, and all sales are being made on the basis of prices ruling on the date of shipment.

### *INTERMEDIATES*

Domestic aniline oil is difficult to obtain and offered for future shipment at 32 to 35 cents. A firm market is noted on benzidine, under restricted offerings, the market holding at $1.25 to $1.35 for base, with sulphate at 85 cents per pound. Dimethylaniline is offered a little off at $1.60 per pound. Nitrobenzol firmly held at 13½ to 15 cents per pound. Paraphenylendiamine is quoted up at $2.70 to $2.85 per pound, with a strong market ruling.

### *MISCELLANEOUS*

A quiet market for wax is reported, with business restricted to filling a quiet jobbing inquiry; market generally quoted unchanged.

Steady domestic buying of glues is keeping the market steady on the basis of quoted prices. Extra white firm at 20 @ 35 cents per pound, with cabinet held at 25 @ 36 cents per pound.

### *Current Prices for Chemicals, Fillers, Colors, etc.*

| | | | |
|---|---|---|---|
| Acetone, carlots | lb. | .19¾ @ | .20 |
| smaller lots | lb. | .21 @ | .21½ |
| Acetanilid, C. P., bbls. | lb. | .70 @ | .75 |
| Acids, Acetic, 56% | cwt. | 8.15 @ | 8.90 |
| Carbolic, C. P. | lb. | .12 @ | .20 |
| **Muriatic, 20 deg.** | **cwt.** | **1.75 @** | **2.00** |
| **Muriatic, 22 deg.** | **cwt.** | **2.50 @** | **2.75** |
| Nitric, 42 deg. | cwt. | 7.50 @ | 8.00 |
| **Nitric, 40 deg.** | **cwt.** | **6.75 @** | **7.25** |
| Sulphuric, 60 deg. carlots | tons. | 19.00 @ | 21.00 |
| Sulphuric, 60 deg. carboys | | — @ | — |
| **Tartaric, crystals** | **lb.** | **.69½ @** | **—** |
| Aluminum Silicate | | — @ | — |
| Aniline oil, bulk basis, Contract | | — @ | — |
| Imported | | Nominal | |
| Domestic | | .32 @ | .35 |
| Antimony— | | | |
| Oxide | lb. | .13½ @ | .14 |
| Sulphuret, red | lb. | .25 @ | .30 |
| Sulphuret, golden | lb. | .30 @ | .35 |
| Sulphuret, crimson | lb. | .45 @ | .50 |
| Alcohol, denatured, 190 proof | | .98 @ | 1.02 |
| Wood, 95% | | 2.65 @ | 2.70 |
| Ethyl, 190 proof | | 5.15 @ | 5.25 |
| Aldehyde Ammonia | | Nominal | |
| Ammonia | | — @ | — |
| Ammonium Carbonate, domestic | lb. | .16 @ | .16½ |
| Amyl Acetate | gal. | 4.10 @ | 4.25 |
| Anthracene, 80% | | .95 @ | 1.00 |
| Anthroquinine, 95% | | 4.00 @ | 4.25 |
| Asbestine | | — @ | — |
| Asphaltum, Egyptian | lb. | .30 @ | — |
| Domestic | ton | .30 @ | .40 |
| Barium, dust | | — @ | — |
| **Sulphide** | **lb.** | **.07¼ @** | **.07½** |
| **Barytes, prime white imported** | ton | Nominal | |
| white, domestic | ton | 34.00 @ | 36.00 |
| off color, domestic | lb. | .21 @ | .24 |
| Southern, f.o.b. mills | | 23.00 @ | 25.00 |
| Western, f.o.b. mills | | 23.00 @ | 25.00 |
| Beeswax | | .30 @ | .65 |
| Benzidine Base | lb. | 1.25 @ | 1.30 |
| Benzol, 90% | gal. | .25 @ | .28 |
| Benzol, pure bulk, 100 | | .27 @ | .30 |
| Blanc Fixe, dry, bbls | lb. | .05 @ | — |
| Burgundy Pitch, dom | lb. | .08 @ | .10 |
| Foreign | | .60 @ | .65 |
| Blacks, Drop | lb. | .05½ @ | .15 |
| Ivory | lb. | .16 @ | .30 |
| Carbon, gas, cases | lb. | .12 @ | .25 |
| Lampblack R. M. | lb. | .15 @ | .45 |
| Mineral blacks | ton | 35.00 @ | 45.00 |
| Blues, Prussian | | .90 @ | — |
| Soluble | lb. | .90 @ | — |
| Ultramarine | lb. | .15 @ | .50 |
| Browns, Umber, Turkey, burnt, powdered | lb. | .05½ @ | .07 |
| American, burnt | lb. | .04½ @ | .06 |
| Cadmium sulphide, yellow | lb. | 1.75 @ | 1.80 |
| Carbon Disulphide, bulk | lb. | — @ | — |
| Bisulphide | lb. | .07 @ | .08 |
| Casein, C. P. | lb. | .35 @ | .40 |
| Castor Oil | | .19 @ | .22 |
| Caustic Soda, 76% | cwt. | 6.75 @ | 7.00 |
| Chalk, precipitated, extra light | lb. | .04½ @ | .05 |
| heavy | lb. | .03½ @ | .04 |
| China clay, domestic | ton | 8.50 @ | 20.00 |
| imported | ton | 18.00 @ | 23.50 |
| China Wood Oil, bbls | lb. | .24¾ @ | .25 |
| F.o.b. Pacific Coast | | .22½ @ | .23 |
| Chloroform, U. S. P. | | .35 @ | .36 |
| Coal Tar Pitch | | — @ | — |
| Cottonseed Oil, crude, f.o.b. mills | lb. | 16.00 @ | Nom. |
| Prime summer yellow, bbls. | | 18.00 @ | 18.50 |
| Dimethylaniline | lb. | Nominal | |
| Elateron | | — @ | — |
| Formaldehyde, spot | lb. | .63 @ | .67 |
| Fullers Earth, powd., 100 lbs. | | 1.50 @ | 2.00 |

| | | | |
|---|---|---|---|
| Fossil flour | lb. | .03¾ @ | .05 |
| Genasco Mineral Rubber | | — @ | — |
| Gilsonite | ton | 55.00 @ | — |
| Glue, extra white | lb. | .35 @ | .40 |
| medium | lb. | .30 @ | .35 |
| low grade | | .20 @ | .25 |
| foot stock | | .13 @ | .18 |
| brown foots | | .12 @ | .16 |
| common bone | | .11 @ | .15 |
| Glycerine, C. P. (drums) | lb. | .23½ @ | .24 |
| cans | | .25½ @ | .26 |
| Graphite, flake (bbl.) | lb. | .14 @ | .25 |
| powdered (bbl.) | lb. | .05 @ | .10 |
| Green, chrome, R. M. | lb. | .39 @ | .60 |
| Ground glass (fine) | lb. | .03½ @ | .04 |
| Hexamethylene | lb | Nominal | |
| Infusorial earth, powd'd. | lb. | .02 @ | .035 |
| bolted | lb. | .035 @ | — |
| Iron oxide, red, reduced grades | lb. | .13 @ | .15 |
| red, pure, bright | lb. | — @ | — |
| Hexamethyenetetramine | lb. | 1.93 @ | 2.50 |
| Koolin | | — @ | — |
| Lime, hydrated | | — @ | — |
| Lead, red, dry (casks) | lb. | .12¼ @ | .12½ |
| sublimed | lb. | — @ | — |
| white, basic carb. | lb. | .10½ @ | .11 |
| white, basic sulp. | lb. | .09¾ @ | .10¼ |
| Lime flour | | .01¾ @ | .02 |
| Litharge (casks) | lb. | .11¾ @ | .12¼ |
| English | lb. | — @ | — |
| Lithopone, domestic, bbls. | lb. | .08 @ | .08¼ |
| in bags | lb. | .07¾ @ | — |
| Magnesia, carbonate | lb. | .17 @ | .21 |
| calcined light | lb. | .60 @ | .65 |
| Magnesite, calcined, pwd. | ton | 50.00 @ | 65.00 |
| Magnesia Oxide, heavy | | — @ | — |
| Light | | — @ | — |
| Extra light | | — @ | — |
| Napthalene | | Nominal | |
| Nitrobenzol | | .16 @ | .17 |
| Naphtha, motor gasoline, (steel bbls.) | gal. | .28½ @ | — |
| 68 @ 70 degrees (steel bbls.) | gal. | .35½ @ | — |
| 70 @ 72 degrees (steel bbls.) | gal. | .36½ @ | — |
| 73 @ 76 degrees (steel bbls.) | gal. | .38½ @ | — |
| machine (steel bbls.) | gal. | .47½ @ | — |
| Oil corn, crude factory | cwt. | 17.31 @ | — |
| corn, ref. (bbls.) | cwt. | 20.06 @ | — |
| linseed (bbls.) | | 1.87 @ | — |
| in carloads, spot | | 1.84 @ | — |
| tank cars | | 1.79 @ | — |
| M. R. X. | | — @ | — |
| Oil palm, Lagos | lb. | .16 @ | .16¼ |
| Niger | | .14¾ @ | — |
| pine, yellow | gal. | 1.00 @ | — |
| distilled | gal. | 1.25 @ | 1.55 |
| rapeseed, refined | gal. | 1.64 @ | — |
| rapeseed, blown | gal. | 1.64 @ | — |
| rosin, first rectified. | gal. | .90 @ | — |
| second run | | .93 @ | — |
| tar (commercial) | gal. | .36 @ | .38 |
| Oleum Acid, 20% | ton | 29.00 @ | 35.00 |
| Orange mineral, Amer. | lb. | .15½ @ | .16½ |
| imported | lb. | — @ | — |
| Ozokerite | | .35 @ | .36 |
| Paraphenylenediamine | lb. | 2.70 @ | 2.85 |
| Petrolatum, bbls., amber. | lb. | .06 @ | .07 |
| pale yellow | lb. | .06½ @ | .07 |
| Paranitrosodimethlyanaline | | — @ | — |
| Paraffin, refined, 118@120 m. p. | | .10½ @ | — |
| 127@129 m. p. | | .11 @ | — |
| 137@140 m. p. | | .12½ @ | — |
| Phenol | | .12 @ | .25 |
| Pumis | | .05 @ | .10 |
| Pine tar kiln | bbl. | 14.50 @ | — |
| Pitch | bbl. | 8.50 @ | — |
| Plaster of paris | bbl. | 2.00 @ | 3.00 |
| Red Tuscan | lb. | .22 @ | .30 |
| red (American) | lb. | .14 @ | .16 |
| Indian (English) | lb. | .14 @ | .16 |
| Standard | lb. | — @ | — |
| Rosin (common to good)—280 lbs. | | 18.50 @ | — |
| Rotten stone, powdered | lb. | .02½ @ | .04½ |
| Rubber, substitute, black. | lb. | .13 @ | .17 |
| white | lb. | .15 @ | .24 |
| brown | lb. | .20 @ | .25 |
| Rosin Oil, first rectified | | .90 @ | — |
| Second rectified | | .93 @ | — |
| Third rectified | | 1.11 @ | — |
| Fourth rectified | | 1.15 @ | — |
| Soda ash, light, 58% | cwt. | 3.50 @ | 3.60 |
| Sodium Nitrite | lb. | .24 @ | — |
| Solvent Naptha, crude, bvy | | .22 @ | .27 |
| Soya Bean Oil, bbls. | lb. | .17½ @ | — |
| Sellers tanks, f.o.b. Coast | | .14½ @ | — |
| Stearic Acid, single | | .22½ @ | .25¼ |
| Sulphur Chloride | | — @ | — |
| Shellac, fine orange | lb. | — @ | — |
| T. N. | lb. | 1.40 @ | 1.45 |
| Bleached ordinary | lb. | 1.30 @ | 1.35 |
| Bleached bonedry | lb. | 1.50 @ | 1.55 |
| Silex (silica) | ton | 22.00 @ | 40.00 |
| Soapstone, powdered | ton | 12.00 @ | 17.50 |
| Starch, corn, powd. | cwt. | 5.97 @ | 6.23 |
| pearl | | 4.97 @ | 5.19 |
| Jap, potato.duty pd, | lb. | .09½ @ | — |
| Sulphur, crude | ton, | — @ | — |
| 100 pounds | | — @ | — |
| roll | | 3.20 @ | — |
| commercial superfine | | 2.00 @ | 2.25 |
| Talc, American | ton | 20.00 @ | 40.00 |
| French | ton | — @ | — |
| Thiocarbanilid | | — @ | — |
| Toluol, pure, in drums | gal. | .28 @ | .32 |
| commercial | | .30 @ | .32 |
| Tripolite earth | lb. | .01½ @ | — |
| Turpentine, pure gum—spirit | gal. | 2.65 @ | — |
| wood | gal. | — @ | — |
| Venice, artificial | gal. | .15 @ | .16 |
| true | | 4.50 @ | 4.75 |
| Vermilion, English | lb. | 1.65 @ | — |
| American | | .25 @ | .30 |
| Vorite | | — @ | — |
| Wax, beeswax, crude yel. | lb. | .32 @ | .33½ |
| refined | | .38 @ | .40½ |
| Bayberry | | .39 @ | .40 |
| ceresin, white | lb. | .15 @ | .16 |
| yellow | | .14 @ | .15 |
| Whiting, commercial | cwt. | 1.15 @ | 1.20 |
| Gilders Bolted | | 1.20 @ | 1.25 |
| Paris white, Amer. | cwt. | 1.50 @ | 1.75 |
| English cliffstone | cwt. | 1.75 @ | 2.50 |
| Xylol (gal.) pure | | .42 @ | .47 |
| Commercial | | .33 @ | .37 |
| Zinc Oxide, French process, red seal | | .11½ @ | .11¾ |
| green seal | | .12½ @ | .12¾ |
| white seal | | .13½ @ | .13¾ |
| Leaded Grades— | | | |
| Commercial, lead free | | .09½ @ | .10 |
| 5% lead sulphate | | .09 @ | .09½ |
| 10% lead sulphate | | .08¾ @ | .09½ |
| 20% lead sulphate | | .08½ @ | .09 |
| 35% lead sulphate | | .08¼ @ | .08¼ |
| Zinc Sulphate | | .03½ @ | .04½ |

# Scrap Rubber

NEW YORK, April 21, 1920.

The market has been a dull affair during the past fortnight, and there is an easy undertone in evidence in many quarters of the market. Reclaimers and moulders are not in the market for any quantities of scrap rubber stock while the market for crude remains on the present basis, which is comparatively low, when prices ruling on other commodities used in the rubber manufacturing industry are taken into account.

There is some selling pressure in evidence in the market for old boots and shoes, the market having been fairly glutted with supplies for a while back, heavy consignments coming in from all quarters.

| | Cents per Pound. | | |
|---|---|---|---|
| Boots and shoes | 7.50 | @ | 7.75 |
| Arctics, trimmed | 5.75 | @ | 6.00 |
| Arctics, untrimmed | 5.00 | @ | .... |
| Tires—Automobile | 3.25 | @ | 3.50 |
| Bicycles, pneumatic | 2.50 | @ | 3.00 |
| Mixed hose | 1.50 | @ | 1.75 |
| Air brake | .... | @ | .... |
| Inner tubes, No. 1 | 15.00 | @ | 18.00 |
| Inner tubes, No. 2 | 9.00 | @ | 10.00 |
| Red tubes | 8.12½ | @ | 9.00 |

# Crude Rubber

NEW YORK, April 21, 1920.

Demand for crude rubber has been listless during the past fortnight, and the market has been generally a dull affair throughout the period. Manufacturers have been forced to curtail their operations, due to the shortages of coal and other raw materials, brought about by the outlaw strike upon the railroads. Consumption of rubber has consequently received a setback during this period.

The market is generally quoted as nominal, practically all of the trading now being put through being deals among the dealers. There is some accumulation of stocks in the spot market, no deliveries having gone toward the Western rubber goods producing centres for practically the entire fortnight. Smoked sheets ribbed are nominally held on the basis of 44½ cents per pound, with first latex crepe holding at 45 cents per pound. Business in futures is dull, with the market quoted on the average about 2 cents per pound over spot prices for forward delivery.

| | Cents per Pound. | | |
|---|---|---|---|
| Para—Up-river fine | .42 | @ | — |
| Up-river medium | .40½ | @ | — |
| Up-river coarse | .31½ | @ | — |
| Caucho ball | .33 | @ | — |
| Islands fine | .42 | @ | — |
| Islands coarse | .22 | @ | — |
| Cameta | .21½ | @ | — |
| Ceylon—Smoked sheets, r.l.bed. | .44½ | @ | — |
| Smoked sheets, plain | .43 | @ | — |
| Madeira, fine | .44 | @ | — |
| Knapsack | — | @ | — |
| First latex pale crepe | .45 | @ | — |
| Amber crepe | Nominal | | |
| Clean brown crepe | — | @ | — |
| Rio Nunez string | — | @ | — |
| Palembang | .13 | @ | — |
| African | .33 | @ | — |
| Prime Surinam sheets | — | @ | — |
| Centrals—Corinto prime | .32 | @ | .32½ |
| Esmeralda, prime | .32 | @ | .32½ |
| *Balata, sheets | — | @ | — |
| Guayule, wet | .27 | @ | — |
| Balata, block, Panama | .37 | @ | — |

* Nominal.

ARE YOU
in the
MARKET
for
PLANTATION
RUBBER
Are you in the market for PLANTATION RUBBER? If so it is largely to your interest to communicate with "THE HOUSE OF BIRKENSTEIN" at either of the four addresses given below for latest prices on FIRST LATEX—LIGHT BROWN CREPE—AND PRIME SMOKED SHEET.
For years we have led the field for Scrap Rubber handling. We may not be leading the field in PLANTATION RUBBER as yet, but we can quote you prices and name other distinct advantages that are of interest to you. Suppose you write us today.
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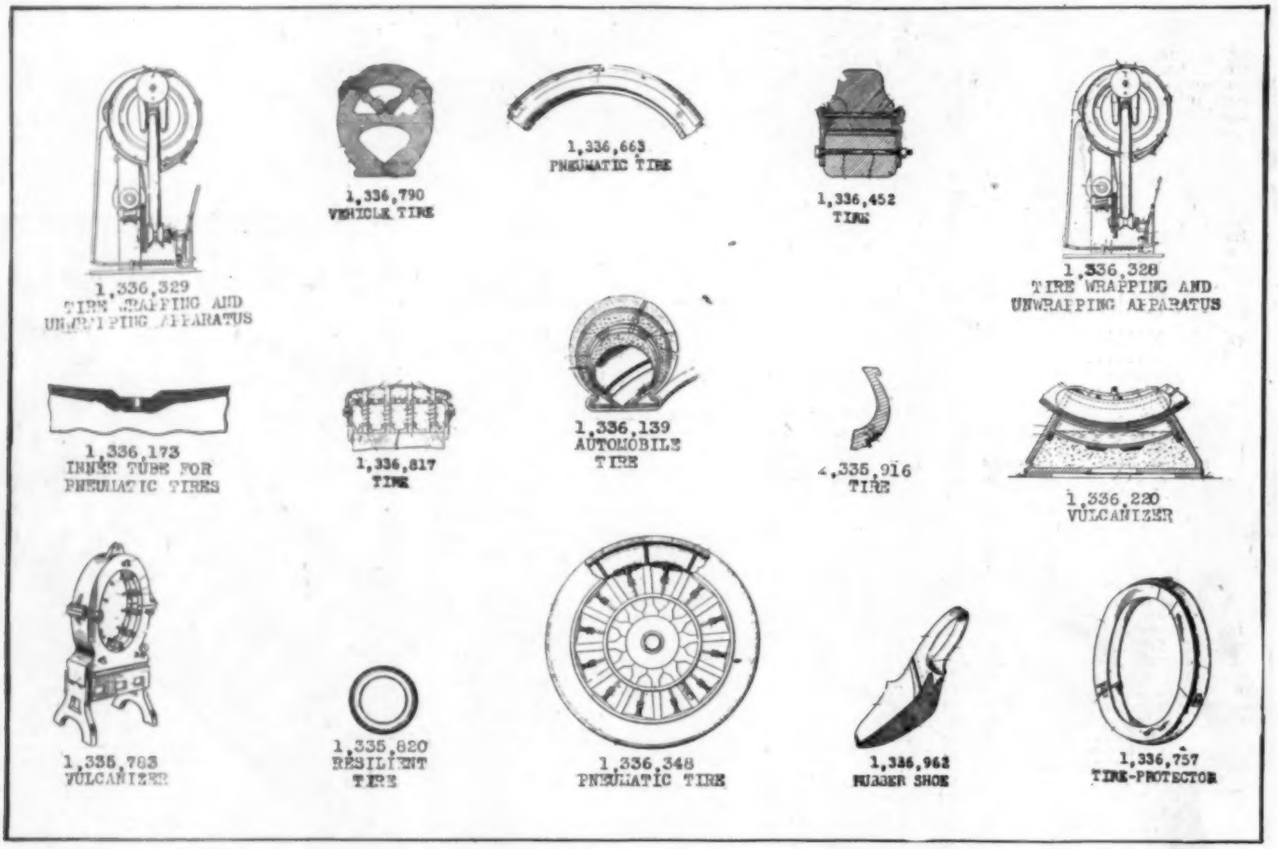
The House of Birkenstein

# American Rubber Patents

ISSUED APRIL 6, 1920

1,333,783—To Arthur A. Dorsey, Lawrence, Kans. Vulcanizer.
1,335,820—To Frederick C. Cave, Des Moines, Iowa. Resilient tire.
1,335,916—To Ambrose Macdonald Poynter, London, England. Tire.
1,335,926—To Douglas Frank Twiss, Birmingham, England, assignor to Dunlop Rubber Company, Ltd., Birmingham, England. Method of reclaiming rubber.
1,336,139—To Leo Hofmeister, Milwaukee, Wis. Automobile tire.
1,336,173—To John J. Vorhees, Jersey City, N. J., assignor to U. S. Compression Inner Tube Co., Tulsa, Okla. Inner tube for pneumatic tires.




1,336,220—To William A. Gwynn, St. Louis, Mo., assignor to Susie E. Gwynn, St. Louis, Mo. Vulcanizer.
1,336,328—To Crawford Ziegler, Barberton, Ohio. Tire wrapping and unwrapping apparatus.
1,336,329—To Crawford Ziegler, Barberton, Ohio. Tire wrapping and unwrapping apparatus.
1,336,348—To Edwin George Fido, Bombay, India. Pneumatic tire.

ISSUED APRIL 13, 1920

1,336,452—To Herbert K. Wheelock, Long Beach, Cal. Tire.
1,336,663—To Elliott M. Story, Braintree, Mass. Pneumatic tire.
1,336,757—To Isaac Raffelson, New York, N. Y. Tire protector.
1,336,790—To Edward R. Simms, Scottdale, Pa. Vehicle tire.
1,336,817—To Edward Carrau, Chicago, Ill., assignor of one-half to William F. Walbach, Chicago, Ill. Tire.
1,336,911—To Fred Maier, Los Angeles, Cal., assignor to Western Vulcanizer Mfg. Co., Chicago, Ill. Process for retreading tires.
1,336,962—To Frank A. Joseph, New Haven, Conn., assignor to L. Candee & Co. Rubber shoe.

### McGraw Declares Dividend

On April 1 the McGraw Tire & Rubber Co., of East Palestine, Ohio, declared its regular quarterly dividend of 1¾ per cent on the outstanding preferred capital stock of the company.

### American Tire Consumption

The following review of the present day tendencies in the rubber trade appeared in The Magazine of Wall Street, issue of March 20, 1920:

The biggest single feature of the rubber industry today is the amazing consumption of rubber by the tire industry, which, of course, is dependent on the unusually strong present position of the automobile industry. It is estimated that the United States consumes three-fourths of the world's rubber, and that the increase in the American consumption between 1919 and 1918 alone amounts to as much as the normal world consumption. The increase in facilities of old companies and the incorporation of new ones to share in the profits of the business indicate a great confidence in the permanent nature of this prosperity.

The difficulty is that tire manufacture is still to some extent a matter of craftsmanship, that is, varies from plant to plant in quality and number of seconds turned out, so that new plants are at a certain handicap in competing with firms of more established reputation. The demand for tires is so keen, however, that consideration of this sort will not keep back a good deal of buying.

Of late increases in the price of tires have marked the industry, the reason being the rising costs of materials and labor. While rubber has at no time shown a strong market position, and has gone through several periods of inactive markets with declining prices, the other materials used, principally long-staple cotton and the chemicals such as sulphur used in the manufacture of tires, have shown great advances.

Outside of tires, there has been a large increase of activity in rubber footwear, directly attributable to the bad weather which has prevailed this winter, and interest is reviving in rubber mechanical goods, particularly electrical equipment. A good part of this production is being exported, notwithstanding adverse exchange conditions in most countries. Exchange really works in two ways in the case of this commodity, however, because some 80 per cent of our rubber is imported through England, so that a drop in exchange rates which would be a handicap on the sale of finished products would make the price of the raw material somewhat lower.

One result of the great activity of last year in the production of tires has been the placing on the market of an unusual amount of rubber scrap, so that the market in this type of rubber material will probably show a declining tendency for some time. This condition is expected to have its reflection in other branches of the rubber industry, as reclaimed rubber, prepared from scrap, is always in a sort of competition with virgin rubber, the better quality of the latter being balanced against its higher price. Therefore, whenever the markets of reclaimed rubber are able to quote considerably lower prices for their commodity than the importers of virgin rubber, there is a tendency toward inactivity and lower prices in the latter. During a great part of last year the declining exchange rates favored the importation of new rubber, but this tendency seems to be over for the time being, at least, so that the scrap market may be expected to show more activity, with possibly lower price schedules.